IN THE UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF CALIFORNIA

SYNOPSYS, INC., Plaintiff, v. RICOH COMPANY, LTD., Defendant.	Case No.: C03 02289 Date: August 19, 2003 Time: 9:30 a.m. Courtroom: 11

DECLARATION OF KENNETH W. BROTHERS
IN SUPPORT OF DEFENDANT'S MOTION TO DISMISS

1. My name is Kenneth W. Brothers. I am an attorney with the firm of Dickstein, Shapiro, Morin & Oshinsky LLP, counsel to Ricoh Company, Limited ("RCL") in the above-captioned matter. I am over the age of 21 and am competent to make this declaration. Based on my personal knowledge and information, I hereby declare to all of the facts in this declaration..

2. On January 21, 2003, RCL filed a complaint against several designers and manufacturers of computer chips. A copy of RCL's complaint and the '432 patent is attached as Exhibit 1.

3. None of the Delaware defendants are incorporated or headquartered in California. Aeroflex, Inc. ("Aeroflex") is a Delaware corporation with its principal place of business in Plainview, New York. (Aeroflex 4/9/03 Amended Answer and Counterclaims ¶ 55, attached as Exhibit 2.)

4. AMI Semiconductor, Inc. ("AMIS") is a Delaware corporation with its principal place of business in Pocatello, Idaho. (AMIS 4/10/03 Amended Answer and Counterclaims ¶ 55, attached as Exhibit 3.)

5. Matrox Tech, Inc. ("Matrox Tech") is incorporated in Delaware with its principal place of business in Boca Raton, Florida. (Matrox Tech 4/9/03 Amended Answer and Counterclaims ¶ 55, attached as Exhibit 4.)

6. Matrox International, Inc. ("Matrox Int'l") is a New York corporation with its principal place of business in Plattsburg, New York. (Matrox Int'l 4/9/03 Amended Answer and Counterclaims ¶ 55, attached as Exhibit 5.)

7. Matrox Electronics Systems Ltd. ("Matrox ESL") and Matrox Graphics Inc. ("Matrox Graphics") are Canadian corporations with their principal places of business in Dorval, Quebec. (Matrox ESL 4/9/03 Amended Answer and Counterclaims ¶ 55, attached as Exhibit 6; Matrox Graphics 4/9/03 Amended Answer and Counterclaims ¶ 55, attached as Exhibit 7.)

8. All of the Delaware defendants have asserted declaratory judgment counterclaims against RCL.

9. In the Delaware action, A Rule 16 scheduling conference was held on May 16, 2003, which established a pretrial and trial schedule. A copy of the scheduling order is attached as Exhibit 8.

10. In the Delaware action, the parties filed their initial disclosures on May 30, 2003. A copy of the defendant' initial disclosures is attached as Exhibit 9.

11. In the Delaware action, the parties have served a large volume of interrogatories, document requests and requests for admission, as set forth on the following chart:

Date	Description	Party
5/30/03	Ricoh's 1st Set of Interrogatories to All Defendants	Ricoh
5/30/03	Ricoh's 2nd Set of Interrogatories to the Matrox Defendants	Ricoh
5/30/03	Ricoh's 1st Set of Request for Admission to All Defendants	Ricoh
5/30/03	Ricoh's 1st Set of Document Requests to All Defendants	Ricoh
6/5/03	Defendant Aeroflex Inc.'s First Set of Interrogatories (Nos. 1-11)	Aeroflex, Inc.
6/5/03	Defendant AMI Semiconductor, Inc.'s First Set of Interrogatories (Nos. 1-2)	AMI Semiconductor, Inc.
6/5/03	Defendants/Counterclaimants' First Set of Requests for Production of Documents (1-32)	All Defendants
6/5/03	Defendant Matrox Electronic Systems Ltd.'s First Set of Interrogatories (Nos. 1-2)	Matrox Electronic Systems Ltd.
6/5/03	Defendant Matrox International Corp.'s First Set of Interrogatories (Nos. 1-2)	Matrox International Corp.
6/5/03	Defendant Matrox Tech, Inc.'s First Set of Interrogatories (Nos. 1-2)	Matrox Tech, Inc.
6/5/03	Defendant Matrox Graphics Inc.'s First Set of Interrogatories (Nos. 1-2)	Matrox Graphics Inc.
7/2/03	Ricoh's 2nd Set of Document Requests to All Defendants	Ricoh

12. RCL's production of documents is underway. The parties also have served subpoenas upon third parties for documents.

13. The Delaware defendants have demanded a Rule 30(b)(6) deposition of RCL, which will be held in Washington, D.C. on July 15, 2003. Defendants have also demanded

the deposition of a third party, Dr. James P. Davis, PhD, which will be held in Columbia, South Carolina on July 17, 2003.

14. Counsel for Synopsys has assumed control of the defense of this case. Synopsys' attorneys have entered appearances on behalf of each of the Delaware defendants. Synopsys' attorneys have filed all papers on behalf of each of the defendants; have attended the Rule 16 conference; and have taken and responded to discovery. Despite this extensive involvement, however, Synopsys has never attempted to become a party, and has never claimed that it has been threatened by RCL.

15. On May 15, 2003, Synopsys filed a declaratory judgment complaint in the above-captioned matter. An RCL board member was served with the Synopsys complaint in New Jersey on June 5, 2003.

Pursuant to 28 U.S.C. § 1746, I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct.

Executed on July 14, 2003.

Kenneth W. Brothers

EXHIBIT 1

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

RICOH COMPANY, LTD. Plaintiff, v. AEROFLEX INCORPORATED, AMI SEMICONDUCTOR, INC., MATROX ELECTRONIC SYSTEMS LTD., MATROX GRAPHICS INC., MATROX INTERNATIONAL CORP. and MATROX TECH, INC., Defendants.	)	C.A. No. _____

COMPLAINT

Plaintiff Ricoh Company, Ltd. ("Ricoh") for its Complaint against Defendants Aeroflex Incorporated ("Aeroflex"), AMI Semiconductor, Inc. ("AMI"), Matrox Electronic Systems Ltd. ("Matrox"), Matrox Graphics Inc. ("Matrox Graphics"), Matrox International Corp. ("Matrox Int'l"), and Matrox Tech, Inc. ("Matrox Tech"), alleges as follows:

PARTIES

1. Plaintiff Ricoh is a corporation organized under the laws of Japan and maintains its principal place of business at 3-6 1-chome, Nakamagome, Tokyo, Japan.

2. Upon information and belief, Defendant Aeroflex is a corporation organized under the laws of the State of Delaware, maintains its principal place of business at 35 S. Service Road, Plainview, NY, 11803, and has appointed The Corporation Trust Company, Corporation Trust Center, 1209 Orange Street, Wilmington, DE 19801 as its registered agent in Delaware.

3. Upon information and belief, Defendant AMI is a corporation organized under the laws of the State of Delaware, maintains its principal place of business at 2300 Buckskin Road,

Pocatello, ID 83201, and has appointed The Corporation Trust Company, Corporation Trust Center, 1209 Orange Street, Wilmington, DE 19801 as its registered agent in Delaware.

4. Upon information and belief, Defendant Matrox is a corporation organized under the laws of Quebec, Canada, maintains its principal place of business at 1055 Boul St-Regis, Dorval, Quebec H9P 2T4 Canada and is doing business in Delaware and/or has committed the acts complained of in Delaware.

5. Upon information and belief, Defendant Matrox Graphics is a corporation organized under the laws of Quebec, Canada, maintains its principal place of business at 1055 Boul St-Regis, Dorval, Quebec H9P 2T4 Canada and is doing business in Delaware and/or has committed the acts complained of in Delaware.

6. Upon information and belief, Defendant Matrox Int'l is a corporation organized under the laws of New York, maintains its principal place of business at 625 State Rt 3, Unit B, Plattsburgh, NY 12901, and is doing business in Delaware and/or has committed the acts complained of in Delaware.

7. Upon information and belief, Defendant Matrox Tech is a corporation organized under the laws of the State of Delaware, maintains its principal place of business at 1075 Broken Sound Parkway, NW, Boca Raton, FL 33487-3524 and has appointed The Corporation Trust Company, Corporation Trust Center, 1209 Orange Street, Wilmington, DE 19801 as its registered agent in Delaware.

JURISDICTION

8. This action arises under the patent laws of the United States, Title 35, United States Code, and more particularly under 35 U.S.C. §§ 271 et. seq.

9. This Court has subject matter jurisdiction over this patent infringement action under the Judicial Code of the United States, 28 U.S.C. §§ 1338(a) and 1331.

10. This Court has personal jurisdiction over the Defendants because Defendants are present and/or doing business in Delaware either directly or through their agents, or alternatively, are incorporated in Delaware.

VENUE

11. Venue is proper in this district pursuant to 28 U.S.C. § 1391 in that Defendants reside in this judicial district and/or a substantial part of the events or omissions giving rise to the claim occurred in this judicial district and/or are found in this judicial district and/or are aliens.

FACTUAL BACKGROUND

12. On May 1, 1990, the U.S. Patent and Trademark Office ("USPTO") duly and legally issued United States Letters Patent No. 4,922,432 (the " '432 Patent") in the names of Hideaki Kobayashi and Masahiro Shindo for their invention titled "Knowledge Based Method and Apparatus for Designing Integrated Circuits using Functional Specifications." A copy of the '432 Patent is attached hereto as Exhibit 1.

13. By assignment, Ricoh is the owner of the entire right, title, and interest in the '432 Patent and has the sole right to sue and recover for infringement thereof.

14. The '432 Patent describes, inter alia, a method for designing an application specific integrated circuit. By using the invention of the '432 Patent, one can define functional architecture independent specifications for an integrated circuit and translate functional architecture independent specifications into the detailed information needed for directly producing the integrated circuit.

PATENT INFRINGEMENT

COUNT 1

15. Ricoh repeats and realleges the allegations set forth in paragraphs 1 through 14 hereof.

16. Upon information and belief, Aeroflex has been and is now infringing the '432 Patent by using, offering to sell, and/or by selling and/or importing into the United States application specific integrated circuits designed by or using information generated by, the process of one or more of claims 13-20 of the '432 Patent, either literally or under the doctrine of equivalents.

17. Upon information and belief, Aeroflex will continue to infringe the '432 Patent unless enjoined by this Court.

18. As a consequence of Aeroflex's infringement, Ricoh has been irreparably damaged to an extent not yet determined, and Ricoh will continue to be irreparably damaged by such acts in the future unless Aeroflex is enjoined by this Court from committing further acts of infringement.

19. Upon information and belief, Aeroflex's infringement of the '432 Patent is willful.

20. Ricoh is entitled to recover damages adequate to compensate for Aeroflex's infringement.

COUNT 2

21. Ricoh repeats and realleges the allegations set forth in paragraphs 1 through 14 hereof.

22. Upon information and belief, AMI has been and is now infringing the '432 Patent by using, offering to sell, and/or by selling and/or importing into the United States application

specific integrated circuits designed by or using information generated by, the process of one or more of claims 13-20 of the '432 Patent, either literally or under the doctrine of equivalents.

23. Upon information and belief, AMI will continue to infringe the '432 Patent unless enjoined by this Court.

24. As a consequence of AMI's infringement, Ricoh has been irreparably damaged to an extent not yet determined, and Ricoh will continue to be irreparably damaged by such acts in the future unless AMI is enjoined by this Court from committing further acts of infringement.

25. Upon information and belief, AMI's infringement of the '432 Patent is willful.

26. Ricoh is entitled to recover damages adequate to compensate for AMI's infringement.

COUNT 3

27. Ricoh repeats and realleges the allegations set forth in paragraphs 1 through 14 hereof.

28. Upon information and belief, Matrox has been and is now infringing the '432 Patent by using, offering to sell, and/or by selling and/or importing into the United States application specific integrated circuits designed by or using information generated by, the process of one or more of claims 13-20 of the '432 Patent, either literally or under the doctrine of equivalents.

29. Upon information and belief, Matrox will continue to infringe the '432 Patent unless enjoined by this Court.

30. As a consequence of Matrox's infringement, Ricoh has been irreparably damaged to an extent not yet determined, and Ricoh will continue to be irreparably damaged by such acts

in the future unless Matrox is enjoined by this Court from committing further acts of infringement.

31. Upon information and belief, Matrox's infringement of the '432 Patent is willful.

32. Ricoh is entitled to recover damages adequate to compensate for Matrox's infringement.

COUNT 4

33. Ricoh repeats and realleges the allegations set forth in paragraphs 1 through 14 hereof.

34. Upon information and belief, Matrox Graphics has been and is now infringing the '432 Patent by using, offering to sell, and/or by selling and/or importing into the United States application specific integrated circuits designed by or using information generated by, the process of one or more of claims 13-20 of the '432 Patent, either literally or under the doctrine of equivalents.

35. Upon information and belief, Matrox Graphics will continue to infringe the '432 Patent unless enjoined by this Court.

36. As a consequence of Matrox Graphics' infringement, Ricoh has been irreparably damaged to an extent not yet determined, and Ricoh will continue to be irreparably damaged by such acts in the future unless Matrox Graphics is enjoined by this Court from committing further acts of infringement.

37. Upon information and belief, Matrox Graphics' infringement of the '432 Patent is willful.

38. Ricoh is entitled to recover damages adequate to compensate for Matrox Graphics' infringement.

COUNT 5

39. Ricoh repeats and realleges the allegations set forth in paragraphs 1 through 14 hereof.

40. Upon information and belief, Matrox Int'l has been and is now infringing the '432 Patent by using, offering to sell, and/or by selling and/or importing into the United States application specific integrated circuits designed by or using information generated by, the process of one or more of claims 13-20 of the '432 Patent, either literally or under the doctrine of equivalents.

41. Upon information and belief, Matrox Int'l will continue to infringe the '432 Patent unless enjoined by this Court.

42. As a consequence of Matrox Int'l's infringement, Ricoh has been irreparably damaged to an extent not yet determined, and Ricoh will continue to be irreparably damaged by such acts in the future unless Matrox Int'l is enjoined by this Court from committing further acts of infringement.

43. Upon information and belief, Matrox Int'l's infringement of the '432 Patent is willful.

44. Ricoh is entitled to recover damages adequate to compensate for Matrox Int'l's infringement.

COUNT 6

45. Ricoh repeats and realleges the allegations set forth in paragraphs 1 through 14 hereof.

46. Upon information and belief, Matrox Tech has been and is now infringing the '432 Patent by using, offering to sell, and/or by selling and/or importing into the United States

application specific integrated circuits designed by or using information generated by, the process of one or more of claims 13-20 of the '432 Patent, either literally or under the doctrine of equivalents.

47. Upon information and belief, Matrox Tech will continue to infringe the '432 Patent unless enjoined by this Court.

48. As a consequence of Matrox Tech's infringement, Ricoh has been irreparably damaged to an extent not yet determined, and Ricoh will continue to be irreparably damaged by such acts in the future unless Matrox Tech is enjoined by this Court from committing further acts of infringement.

49. Upon information and belief, Matrox Tech's infringement of the '432 Patent is willful.

50. Ricoh is entitled to recover damages adequate to compensate for Matrox Tech's infringement.

PRAYER FOR RELIEF

WHEREFORE, Ricoh prays for entry of judgment:

A. that Aeroflex has infringed the '432 Patent;

B. that Aeroflex, its agents, employees, representatives, successors, and assigns and those acting, or purporting to act, in privity or in concert with Aeroflex, be preliminarily and permanently enjoined from further infringement of the '432 Patent;

C. that Aeroflex account for and pay to Ricoh all damages under 35 U.S.C. § 284, including enhanced damages, caused by the infringement of the '432 Patent, and attorneys' fees pursuant to 35 U.S.C. § 285;

D. that Ricoh be granted pre-judgment and post-judgment interest on the damages

caused to it by reason of Aeroflex's infringement of the '432 Patent;

E. that AMI has infringed the '432 Patent;

F. that AMI, its agents, employees, representatives, successors, and assigns and those acting, or purporting to act, in privity or in concert with AMI, be preliminarily and permanently enjoined from further infringement of the '432 Patent;

G. that AMI account for and pay to Ricoh all damages under 35 U.S.C. § 284, including enhanced damages, caused by the infringement of the '432 Patent, and attorneys' fees pursuant to 35 U.S.C. § 285;

H. that Ricoh be granted pre-judgment and post-judgment interest on the damages caused to it by reason of AMI's infringement of the '432 Patent;

I. that Matrox has infringed the '432 Patent;

J. that Matrox, its agents, employees, representatives, successors, and assigns and those acting, or purporting to act, in privity or in concert with Matrox, be preliminarily and permanently enjoined from further infringement of the '432 Patent;

K. that Matrox account for and pay to Ricoh all damages under 35 U.S.C. § 284, including enhanced damages, caused by the infringement of the '432 Patent, and attorneys' fees pursuant to 35 U.S.C. § 285;

L. that Ricoh be granted pre-judgment and post-judgment interest on the damages caused to it by reason of Matrox's infringement of the '432 Patent;

M. that Matrox Graphics has infringed the '432 Patent;

N. that Matrox Graphics, its agents, employees, representatives, successors, and assigns and those acting, or purporting to act, in privity or in concert with Matrox Graphics, be preliminarily and permanently enjoined from further infringement of the '432 Patent;

O. that Matrox Graphics account for and pay to Ricoh all damages under 35 U.S.C. § 284, including enhanced damages, caused by the infringement of the '432 Patent, and attorneys' fees pursuant to 35 U.S.C. § 285;

P. that Ricoh be granted pre-judgment and post-judgment interest on the damages caused to it by reason of Matrox Graphics' infringement of the '432 Patent;

Q. that Matrox Int'l has infringed the '432 Patent;

R. that Matrox Int'l, its agents, employees, representatives, successors, and assigns and those acting, or purporting to act, in privity or in concert with Matrox Int'l, be preliminarily and permanently enjoined from further infringement of the '432 Patent;

S. that Matrox Int'l account for and pay to Ricoh all damages under 35 U.S.C. § 284, including enhanced damages, caused by the infringement of the '432 Patent, and attorneys' fees pursuant to 35 U.S.C. § 285;

T. that Ricoh be granted pre-judgment and post-judgment interest on the damages caused to it by reason of Matrox Int'l's infringement of the '432 Patent;

U. that Matrox Tech has infringed the '432 Patent;

V. that Matrox Tech, its agents, employees, representatives, successors, and assigns and those acting, or purporting to act, in privity or in concert with Matrox Tech, be preliminarily and permanently enjoined from further infringement of the '432 Patent;

W. that Matrox Tech account for and pay to Ricoh all damages under 35 U.S.C. § 284, including enhanced damages, caused by the infringement of the '432 Patent, and attorneys' fees pursuant to 35 U.S.C. § 285;

X. that Ricoh be granted pre-judgment and post-judgment interest on the damages caused to it by reason of Matrox Tech's infringement of the '432 Patent;

Y. that costs be awarded to Ricoh; and

Z. that Ricoh be granted such other and further relief as the Court may deem just and proper under the current circumstances.

by SJF/dmw (4025)
Robert W. Whetzel

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Dated: January 21, 2003

United States Patent [19]
Kobayashi et al.

[11] **Patent Number: 4,922,432**
[45] **Date of Patent: May 1, 1990**

[54] **KNOWLEDGE BASED METHOD AND APPARATUS FOR DESIGNING INTEGRATED CIRCUITS USING FUNCTIONAL SPECIFICATIONS**

[75] Inventors: **Hideaki Kobayashi**, Columbia, S.C.; **Masahiro Shindo**, Osaka, Japan

[73] Assignees: **International Chip Corporation**, Columbia, S.C.; **Ricoh Company, Ltd.**, Tokyo, Japan

[21] Appl. No.: 143,821

[22] Filed: Jan. 13, 1988

[51] Int. Cl.[5] G06F 15/60

[52] U.S. Cl. 364/490; 364/489; 364/488; 364/521

[58] Field of Search 364/488–491, 364/521, 300, 513

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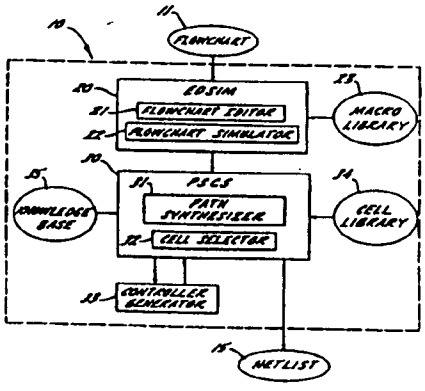
Primary Examiner—Felix D. Gruber
Assistant Examiner—V. N. Trans
Attorney, Agent, or Firm—Bell, Seltzer, Park & Gibson

[57] **ABSTRACT**

The present invention provides a computer-aided design system and method for designing an application specific integrated circuit which enables a user to define functional architecture independent specifications for the integrated circuit and which translates the functional architecture independent specifications into the detailed information needed for directly producing the integrated circuit. The functional architecture independent specifications of the desired integrated circuit can be defined at the functional architecture independent level in a flowchart format. From the flowchart, the system and method uses artificial intelligence and expert systems technology to generate a system controller, to select the necessary integrated circuit hardware cells needed to achieve the functional specifications, and to generate data and control paths for operation of the integrated circuit. This list of hardware cells and their interconnection requirements is set forth in a netlist. From the netlist it is possible using known manual techniques or existing VLSI CAD layout systems to generate the detailed chip level topological information (mask data) required to produce the particular application specific integrated circuit.

20 Claims, 12 Drawing Sheets



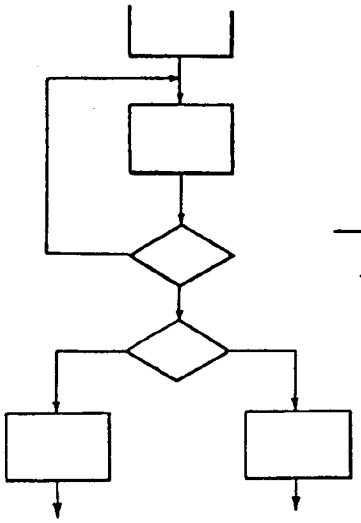


Fig. 1a.
FUNCTIONAL LEVEL

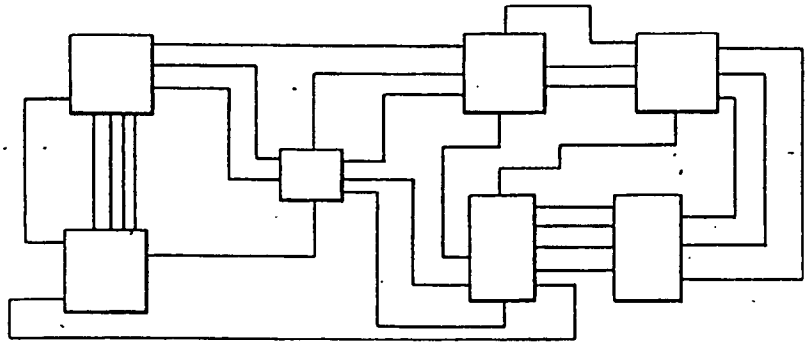


Fig. 1b.
STRUCTURAL LEVEL

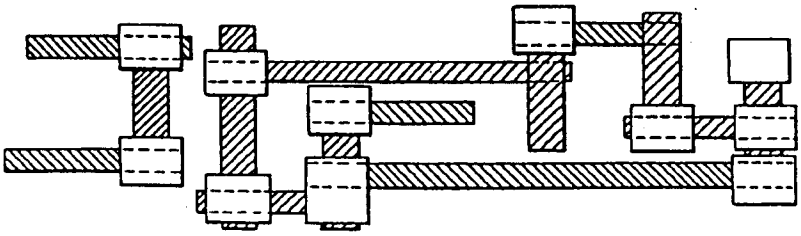


Fig. 1c.
PHYSICAL LAYOUT LEVEL

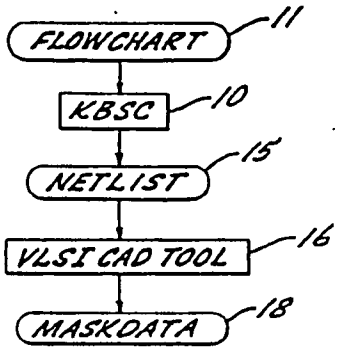

FLOWCHART
11
KBSC
10
NETLIST
15
VLSI CAD TOOL
16
MASKDATA
18

Fig. 2.

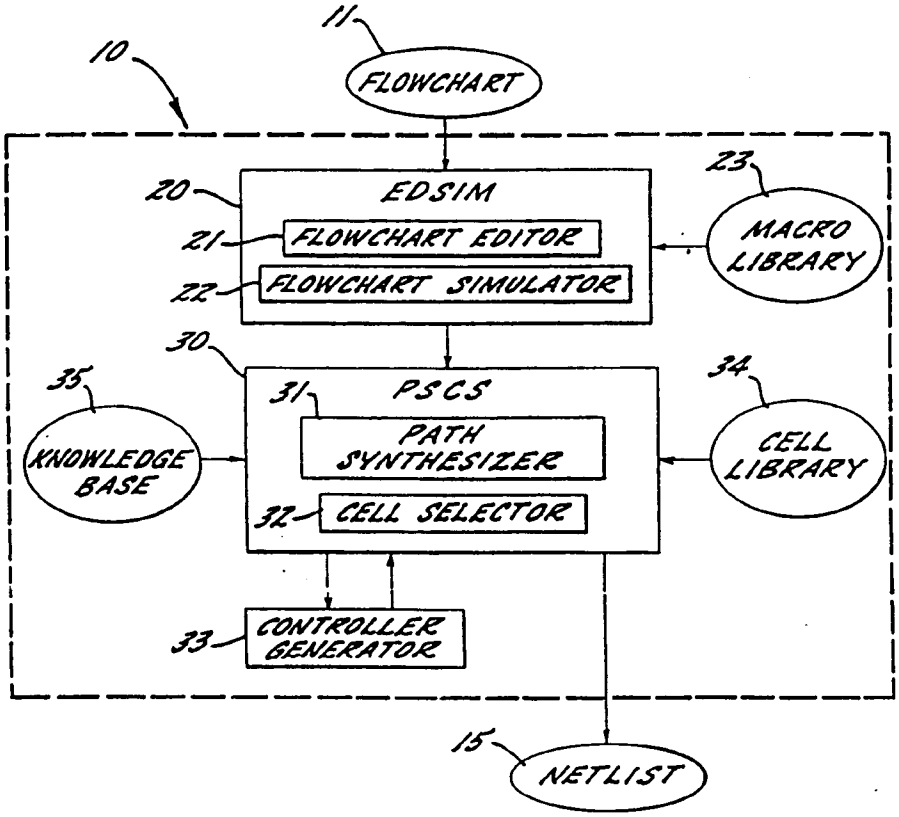

11
10
FLOWCHART
20
EDSIM
21
FLOWCHART EDITOR
22
FLOWCHART SIMULATOR
23
MACRO LIBRARY
30
31
PSCS
PATH SYNTHESIZER
32
CELL SELECTOR
35
KNOWLEDGE BASE
34
CELL LIBRARY
33
CONTROLLER GENERATOR
15
NETLIST

Fig. 3.

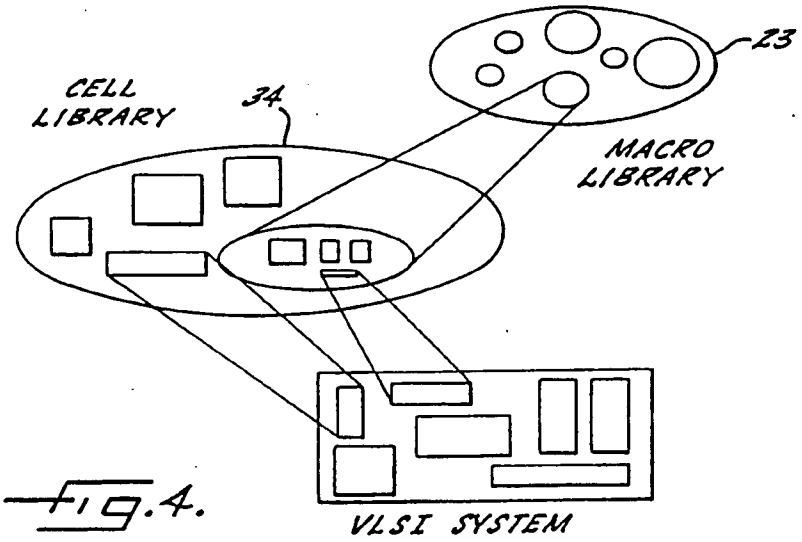

23
CELL LIBRARY
34
MACRO LIBRARY
VLSI SYSTEM

Fig. 4.

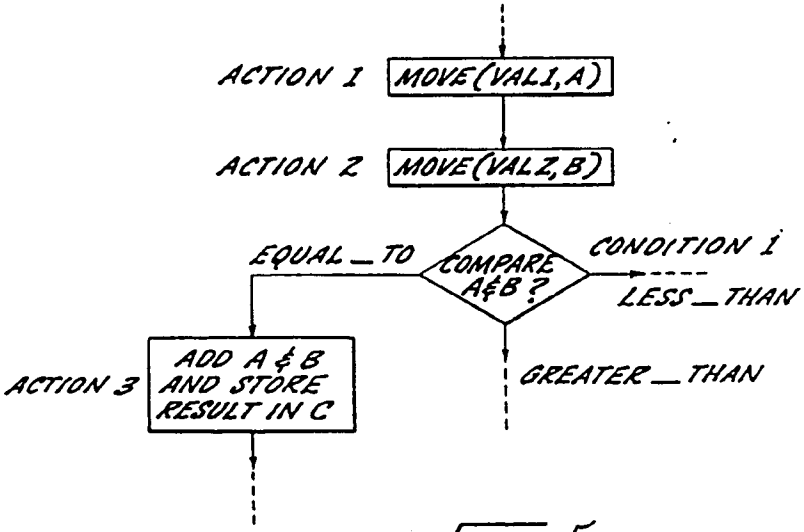

ACTION 1
MOVE(VAL1,A)
ACTION 2
MOVE(VAL2,B)
EQUAL_TO
COMPARE A&B ?
CONDITION 1
LESS_THAN
GREATER_THAN
ACTION 3
ADD A & B AND STORE RESULT IN C

Fig. 5.

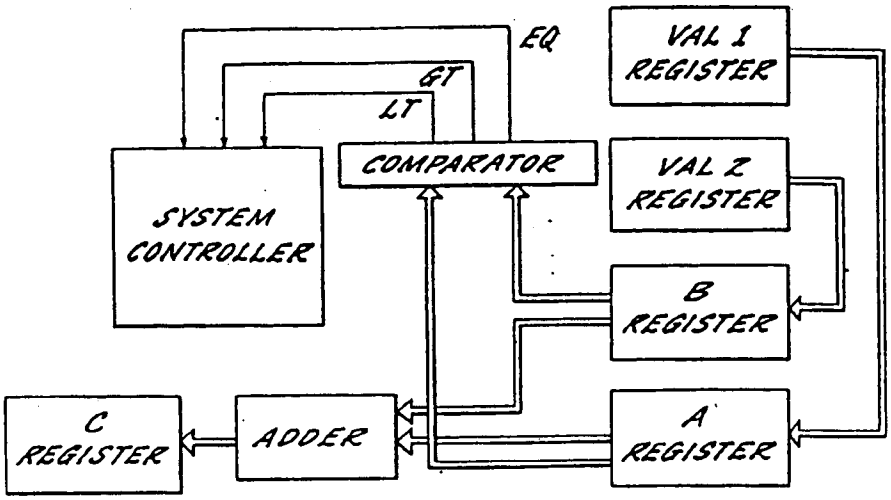

EQ
GT
LT
VAL 1 REGISTER
COMPARATOR
VAL 2 REGISTER
SYSTEM CONTROLLER
B REGISTER
C REGISTER
ADDER
A REGISTER

Fig. 6.

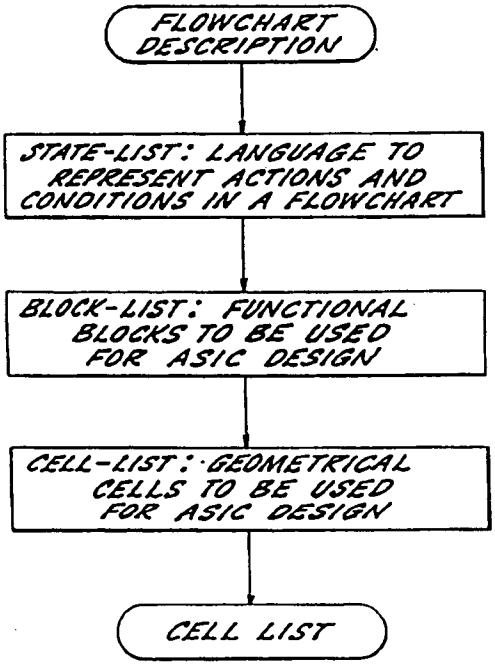

FLOWCHART DESCRIPTION
STATE-LIST: LANGUAGE TO REPRESENT ACTIONS AND CONDITIONS IN A FLOWCHART
BLOCK-LIST: FUNCTIONAL BLOCKS TO BE USED FOR ASIC DESIGN
CELL-LIST: GEOMETRICAL CELLS TO BE USED FOR ASIC DESIGN
CELL LIST

Fig. 9.

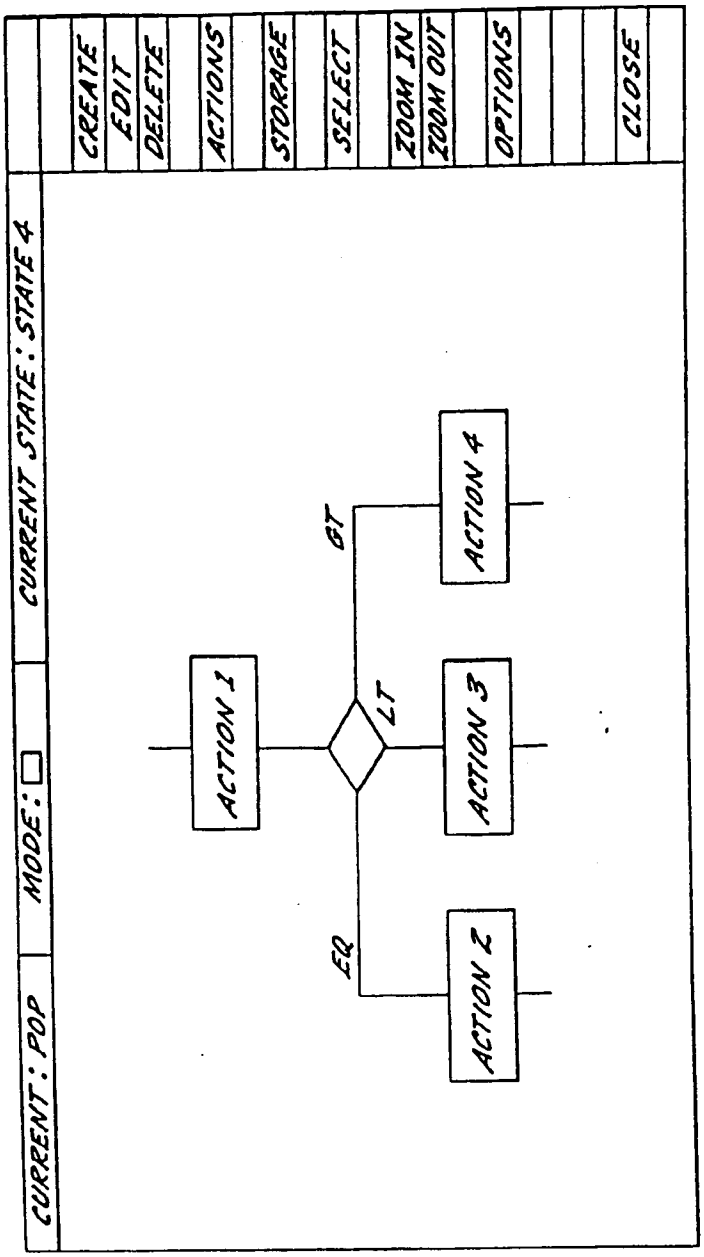

CREATE
EDIT
DELETE
ACTIONS
STORAGE
SELECT
ZOOM IN
ZOOM OUT
OPTIONS
CLOSE
CURRENT STATE: STATE 4
MODE: □
CURRENT: POP
ACTION 1
GT
LT
EQ
ACTION 4
ACTION 3
ACTION 2

FIG. 7.

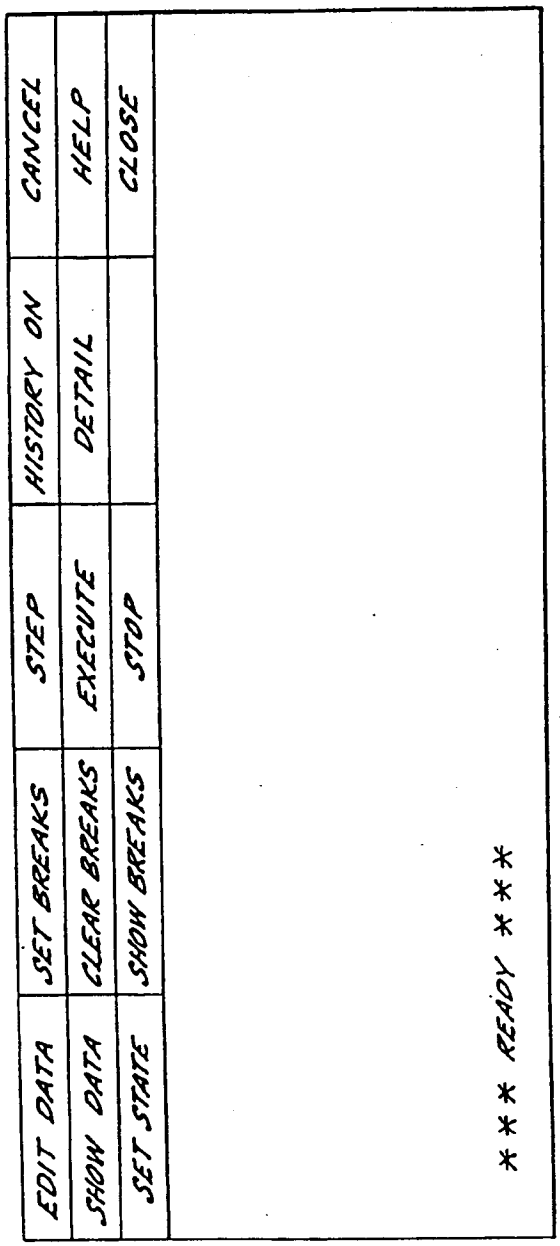

EDIT DATA
SHOW DATA
SET STATE
SET BREAKS
CLEAR BREAKS
SHOW BREAKS
STEP
EXECUTE
STOP
HISTORY ON
DETAIL
CANCEL
HELP
CLOSE
*** READY ***

FIG. 8.

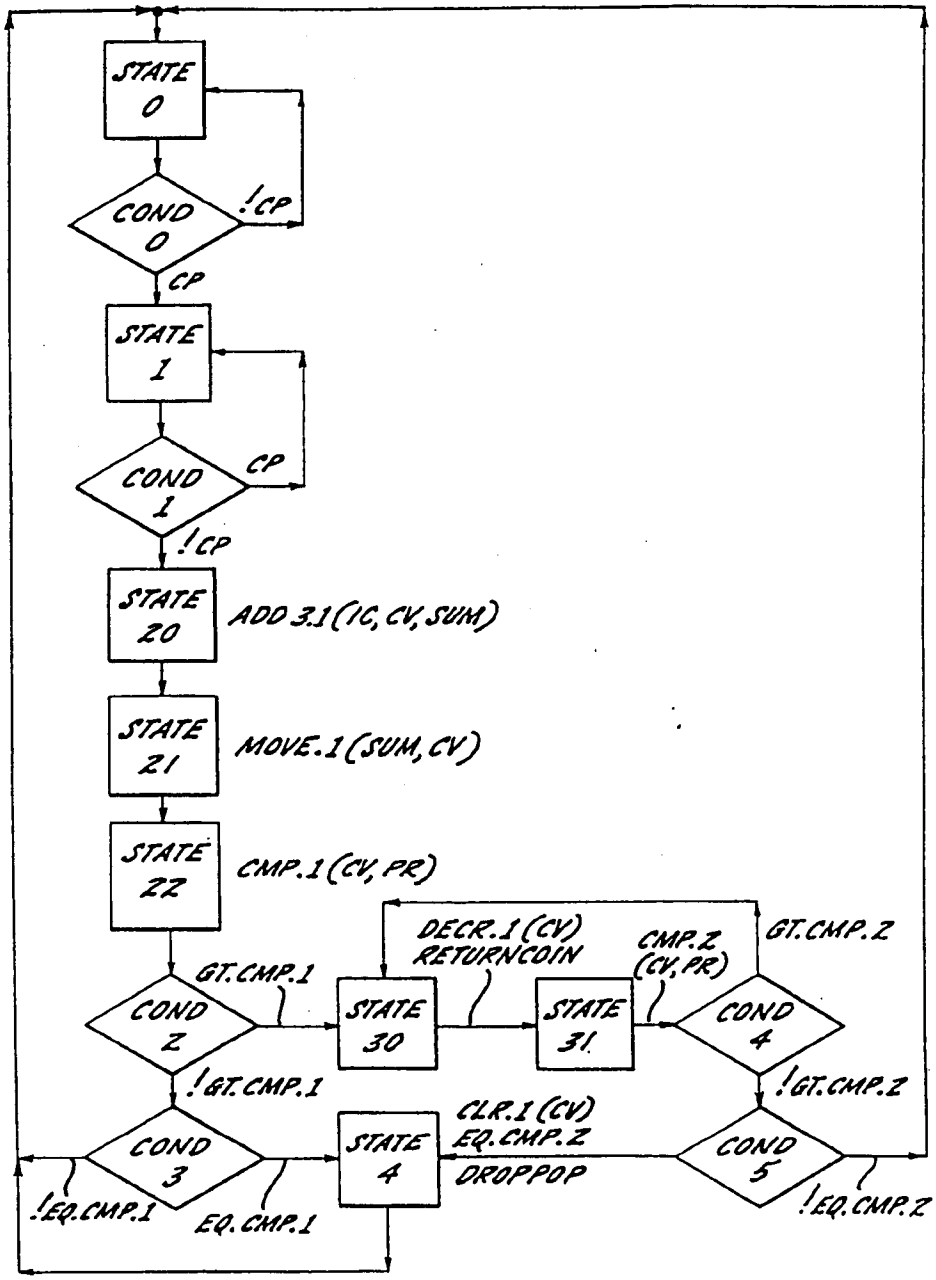

STATE 0
COND 0
!CP
CP
STATE 1
COND 1
CP
!CP
STATE 20
ADD 3.1 (IC, CV, SUM)
STATE 21
MOVE.1 (SUM, CV)
STATE 22
CMP.1 (CV, PR)
GT.CMP.1
COND 2
!GT.CMP.1
STATE 30
DECR.1 (CV)
RETURNCOIN
STATE 31
CMP.2 (CV, PR)
GT.CMP.2
COND 4
!GT.CMP.2
COND 3
!EQ.CMP.1
EQ.CMP.1
STATE 4
CLR.1 (CV)
EQ.CMP.2
DROPPOP
COND 5
!EQ.CMP.2

Fig. 10.

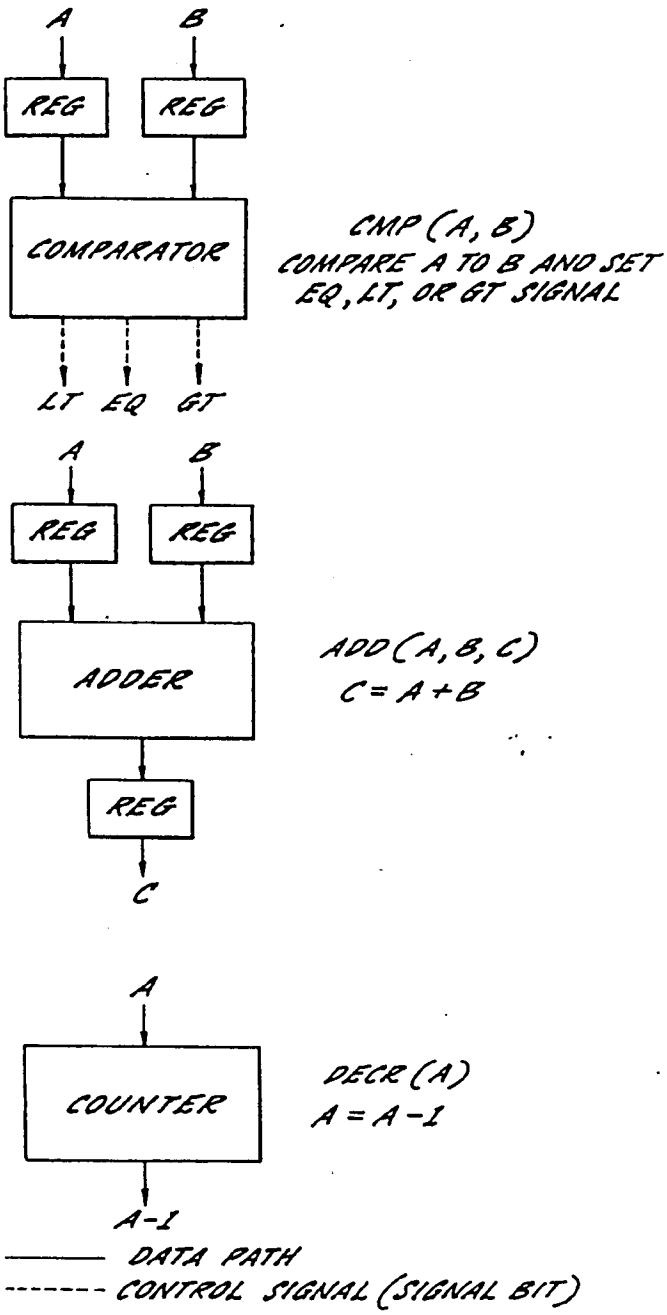

A
B
REG
REG
COMPARATOR
CMP (A, B)
COMPARE A TO B AND SET
EQ, LT, OR GT SIGNAL
LT EQ GT
A
B
REG
REG
ADDER
ADD (A, B, C)
C = A + B
REG
C
A
COUNTER
DECR (A)
A = A - 1
A-1
DATA PATH
CONTROL SIGNAL (SIGNAL BIT)

Fig. 11.

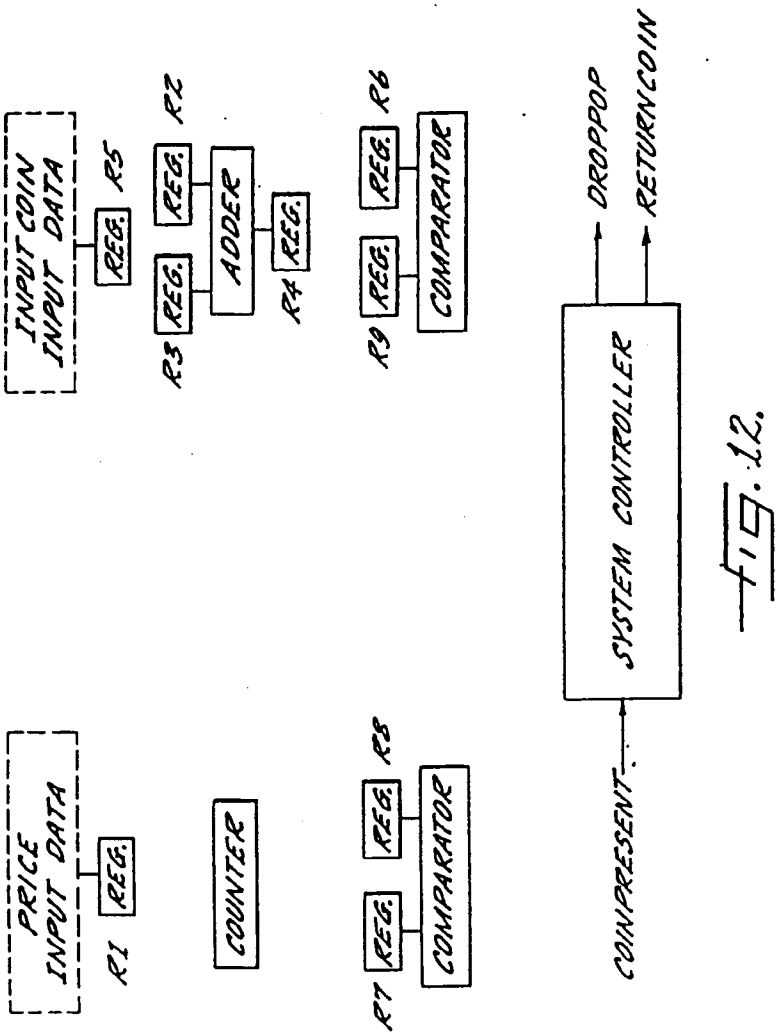

INPUT COIN
INPUT DATA
REG.
R5
REG.
R2
REG.
R3
ADDER
R4
REG.
REG.
R6
REG.
R9
COMPARATOR
DROPPOP
RETURN COIN
SYSTEM CONTROLLER
COINPRESENT
PRICE
INPUT DATA
REG.
R1
COUNTER
REG.
R8
REG.
R7
COMPARATOR

FIG. 12.

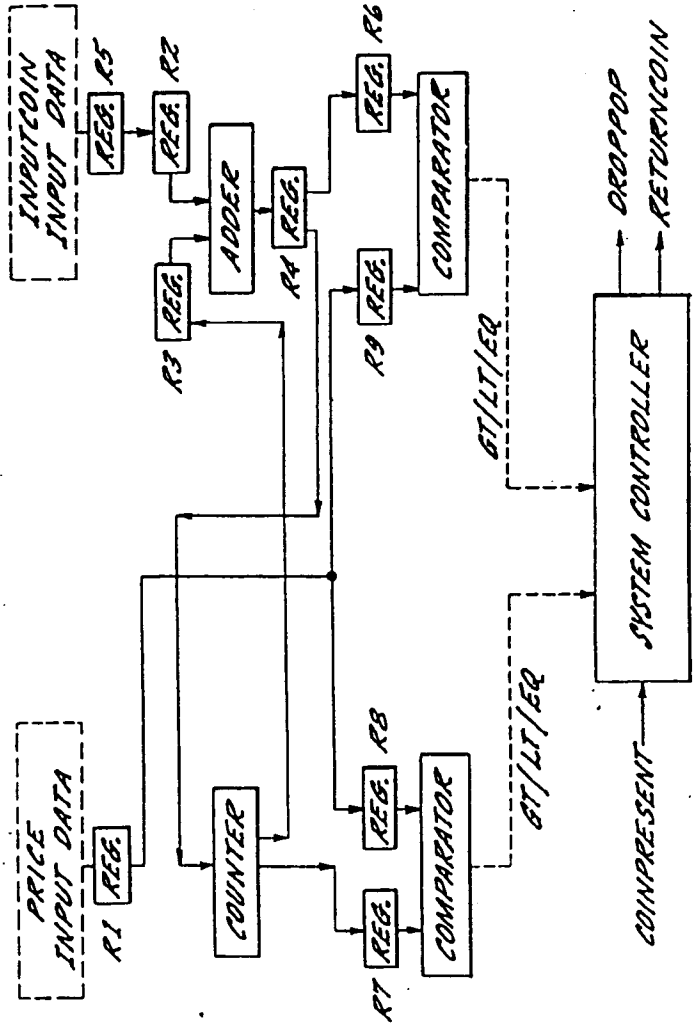

INPUT COIN
INPUT DATA
REG.
R5
R2
ADDER
R4
R6
COMPARATOR
R3
R9
GT/LT/EQ
DROP POP
RETURN COIN
SYSTEM CONTROLLER
PRICE
INPUT DATA
R1
COUNTER
R8
R7
COMPARATOR
COIN PRESENT

FIG. 13.

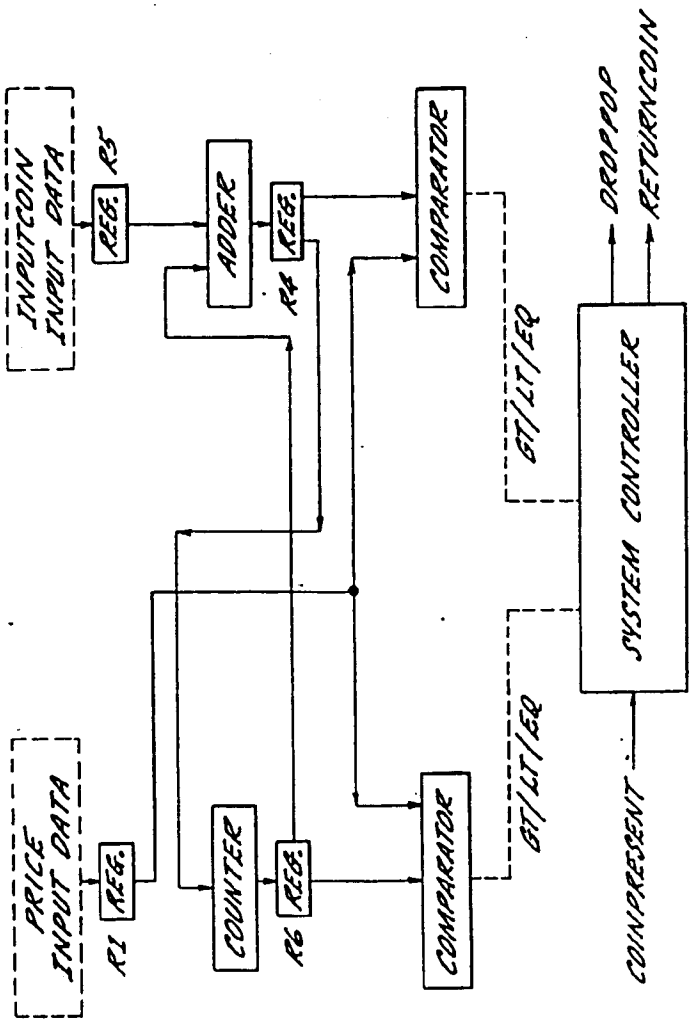

INPUTCOIN
INPUT DATA
REG.
R5
ADDER
REG.
R4
COMPARATOR
DROPPOP
RETURNCOIN
GT/LT/EQ
SYSTEM CONTROLLER
PRICE
INPUT DATA
R1
REG.
COUNTER
REG.
R6
COMPARATOR
GT/LT/EQ
COINPRESENT

FIG. 14.

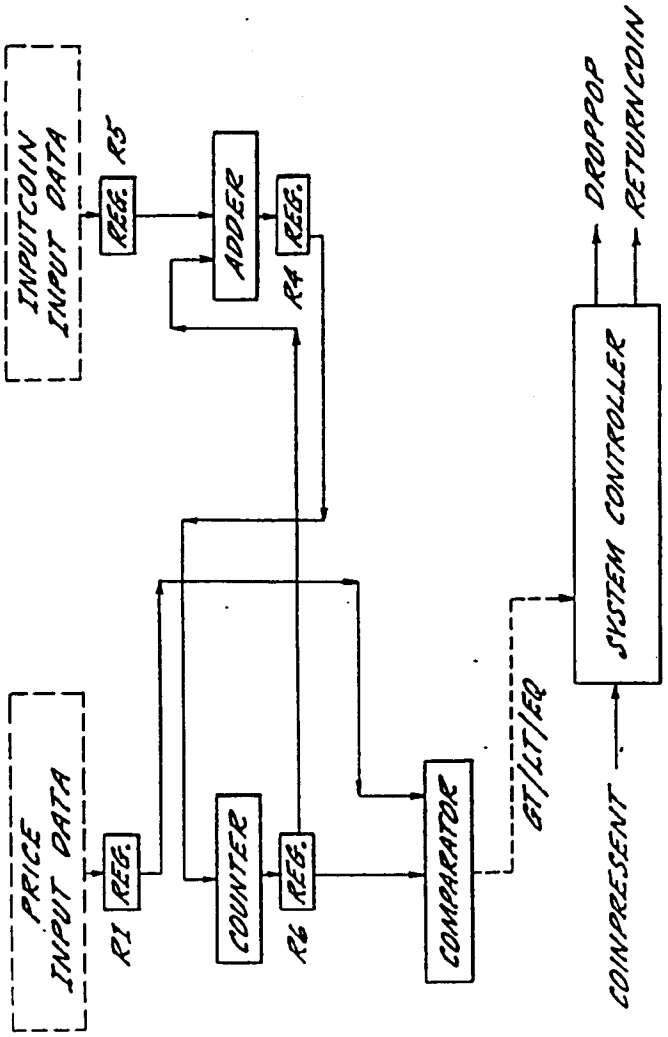

INPUTCOIN
INPUT DATA
REG.
R5
ADDER
REG.
R4
DROPPOP
RETURNCOIN
SYSTEM CONTROLLER
PRICE
INPUT DATA
REG.
R1
COUNTER
REG.
R6
COMPARATOR
GT/LT/EQ
COINPRESENT

FIG. 15.

KNOWLEDGE BASED METHOD AND APPARATUS FOR DESIGNING INTEGRATED CIRCUITS USING FUNCTIONAL SPECIFICATIONS

FIELD AND BACKGROUND OF THE INVENTION

This invention relates to the design of integrated circuits, and more particularly relates to a computer-aided method and apparatus for designing integrated circuits.

An application specific integrated circuit (ASIC) is an integrated circuit chip designed to perform a specific function, as distinguished from standard, general purpose integrated circuit chips, such as microprocessors, memory chips, etc. A highly skilled design engineer having specialized knowledge in VLSI circuit design is ordinarily required to design a ASIC. In the design process, the VLSI design engineer will consider the particular objectives to be accomplished and tasks to be performed by the integrated circuit and will create structural level design specifications which define the various hardware components required to perform the desired function, as well as the interconnection requirements between these components. A system controller must also be designed for synchronizing the operations of these components. This requires an extensive and all encompassing knowledge of the various hardware components required to achieve the desired objectives, as well as their interconnection requirements, signal level compatibility, timing compatibility, physical layout, etc. At each design step, the designer must do tedious analysis. The design specifications created by the VLSI design engineer may, for example, be in the form of circuit schematics, parameters or specialized hardware description languages (HDLs).

From the structural level design specifications, the description of the hardware components and interconnections is converted to a physical chip layout level description which describes the actual topological characteristics of the integrated circuit chip. This physical chip layout level description provides the mask data needed for fabricating the chip.

Due to the tremendous advances in very large scale integration (VLSI) technology, highly complex circuit systems are being built on a single chip. With their complexity and the demand to design custom chips at a faster rate, in large quantities, and for an ever increasing number of specific applications, computer-aided design (CAD) techniques need to be used. CAD techniques have been used with success in design and verification of integrated circuits, at both the structural level and at the physical layout level. For example, CAD systems have been developed for assisting in converting VLSI structural level descriptions of integrated circuits into the physical layout level topological mask data required for actually producing the chip. Although the presently available computer-aided design systems greatly facilitate the design process, the current practice still requires highly skilled VLSI design engineers to create the necessary structural level hardware descriptions.

There is only a small number of VLSI designers who possess the highly specialized skills needed to create structural level integrated circuit hardware descriptions. Even with the assistance of available VLSI CAD tools, the design process is time consuming and the probability of error is also high because of human involvements. There is a very significant need for a better and more cost effective way to design custom integrated circuits.

SUMMARY OF THE INVENTION

In accordance with the present invention a CAD (computer-aided design) system and method is provided which enables a user to define the functional requirements for a desired target integrated circuit, using an easily understood functional architecture independent level representation, and which generates therefrom the detailed information needed for directly producing an application specific integrated circuit (ASIC) to carry out those specific functions. Thus, the present invention, for the first time, opens the possibility for the design and production of ASICs by designers, engineers and technicians who may not possess the specialized expert knowledge of a highly skilled VLSI design engineer.

The functional architecture independent specifications of the desired ASIC can be defined in a suitable manner, such as in list form or preferably in a flowchart format. The flowchart is a highly effective means of describing a sequence of logical operations, and is well understood by software and hardware designers of varying levels of expertise and training. From the flowchart (or other functional specifications), the system and method of the present invention translates the functional architecture independent specifications into structural an architecture specific level definition of an integrated circuit, which can be used directly to produce the ASIC. The structural level definition includes a list of the integrated circuit hardware cells needed to achieve the functional specifications. These cells are selected from a cell library of previously designed hardware cells of various functions and technical specifications. The system also generates data paths among the selected hardware cells. In addition, the present invention generates a system controller and control paths for the selected integrated circuit hardware cells. The list of hardware cells and their interconnection requirements may be represented in the form of a netlist. From the netlist it is possible using either known manual techniques or existing VLSI CAD layout systems to generate the detailed chip level geometrical information (e.g. mask data) required to produce the particular application specific integrated circuit in chip form.

The preferred embodiment of the system and method of the present invention which is described more fully hereinafter is referred to as a Knowledge Based Silicon Compiler (KBSC). The KBSC is an ASIC design methodology based upon artificial intelligence and expert systems technology. The user interface of KBSC is a flowchart editor which allows the designer to represent VLSI systems in the form of a flowchart. The KBSC utilizes a knowledge based expert system, with a knowledge base extracted from expert ASIC designers with a high level of expertise in VLSI design to generate from the flowchart a netlist which describes the selected hardware cells and their interconnection requirements.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be better understood by reference to the detailed description which follows, taken in connection with the accompanying drawings, in which

FIG. 1*a* illustrates a functional level design representation of a portion of a desired target circuit, shown in the form of a flowchart;

FIG. 1*b* illustrates a structural level design representation of an integrated circuit;

FIG. 1*c* illustrates a design representation of a circuit at a physical layout level, such as would be utilized in the fabrication of an integrated circuit chip;

FIG. 2 is a block schematic diagram showing how integrated circuit mask data is created from flowchart descriptions by the KBSC system of the present invention;

FIG. 3 is a somewhat more detailed schematic illustration showing the primary components of the KBSC system;

FIG. 4 is a schematic illustration showing how the ASIC design system of the present invention draws upon selected predefined integrated circuit hardware cells from a cell library;

FIG. 5 is an example flowchart defining a sequence of functional operations to be performed by an integrated circuit;

FIG. 6 is a structural representation showing the hardware blocks and interconnection requirements for the integrated circuit defined in FIG. 5;

FIG. 7 is an illustration of the flowchart editor window;

FIG. 8 is an illustration of the flowchart simulator window;

FIG. 9 is an illustration of the steps involved in cell list generation;

FIG. 10 is an example flowchart for a vending machine system;

FIG. 11 illustrates the hardware components which correspond to each of the three macros used in the flowchart of FIG. 10;

FIG. 12 is an initial block diagram showing the hardware components for an integrated circuit as defined in the flowchart of FIG. 10;

FIG. 13 is a block diagram corresponding to FIG. 12 showing the interconnections between blocks;

FIG. 14 is a block diagram corresponding to FIG. 13 after register optimization; and

FIG. 15 is a block diagram corresponding to FIG. 14 after further optimization.

DETAILED DESCRIPTION OF ILLUSTRATIVE EMBODIMENTS

FIGS. 1*a*, 1*b* and 1*c* illustrate three different levels of representing the design of an integrated circuit. FIG. 1*a* shows a functional (or behavioral) representation architecture independent in the form of a flowchart. A flowchart is a graphic representation of an algorithm and consists of two kinds of blocks or states, namely actions and conditions (decisions). Actions are conventionally represented in the flowchart by a rectangle or box, and conditions are represented by a diamond. Transitions between actions and conditions are represented by lines with arrows. FIG. 1*b* illustrates a structural (or logic) level representation of an integrated circuit. In this representation, blocks are used to represent integrated architecture specific circuit hardware components for performing various functions, and the lines interconnecting the blocks represent paths for the flow of data or control signals between the blocks. The blocks may, for example, represent hardware components such as adders, comparators, registers, system controllers, etc. FIG. 1*c* illustrates a physical layout level representation of an integrated circuit design, which provides the detailed mask data necessary to actually manufacture the devices and conductors which together comprise integrated circuit.

As noted earlier, the design of an integrated circuit at the structural level requires a design engineer with highly specialized skills and expertise in VLSI design. In the KBSC system of the present invention, however, integrated circuits can be designed at a functional level because the expertise in VLSI design is provided and applied by the invention. Allowing the designer to work with flowcharts instead of logic circuit schematics simplifies the task of designing custom integrated circuits, making it quicker, less expensive and more reliable. The designer deals with an algorithm using simple flowcharts at an architecture independent functional (behavioral) level, and needs to know only the necessary logical steps to complete a task, rather than the specific means for accomplishing the task. Designing with flowcharts requires less work in testing because flowcharts allow the designer to work much closer to the algorithm. On the other hand, previously existing VLSI design tools require the designer to represent an algorithm with complex circuit schematics at a structural level, therefore requiring more work in testing. Circuit schematics make it harder for the designer to cope with the algorithm function which needs to be incorporated into the target design because they intermix the hardware and functional considerations. Using flowcharts to design custom integrated circuits will allow a large number of system designers to access VLSI technology, where previously only a small number of designers had the knowledge and skills to create the necessary structural level hardware descriptions.

The overall system flow is illustrated in FIG. 2. The user enters the functional specifications of the circuit into the knowledge based silicon compiler (KBSC) 10 in the form of a flowchart 11. The KBSC 10 then generates a netlist 15 from the flowchart. The netlist 15 includes a custom generated system controller, all other hardware cells required to implement the necessary operations, and interconnection information for connecting the hardware cells and the system controller. The netlist can be used as input to any existing VLSI layout and routing tool 16 to create mask data 18 for geometrical layout.

System Overview

The primary elements or modules which comprise the KBSC system are shown in FIG. 3. In the embodiment illustrated and described herein, these elements or modules are in the form of software programs, although persons skilled in the appropriate art will recognize that these elements can easily be embodied in other forms, such as in hardware.

Referring more particularly to FIG. 3, it will be seen that the KBSC system 10 includes a program 20 called EDSIM, which comprises a flowchart editor 21 for creating and editing flowcharts and a flowchart simulator 22 for simulation and verification of flowcharts. Actions to be performed by each of the rectangles represented in the flowchart are selected from a macro library 23. A program 30 called PSCS (path synthesizer and cell selector) includes a data and control path synthesizer module 31, which is a knowledge based system for data and control path synthesis. PSCS also includes a cell selector 32 for selecting the cells required for system design. The cell selector 32 selects from a cell

library 34 of previously designed hardware cells the appropriate cell or cells required to perform each action and condition represented in the flowchart. A controller generator 33 generates a custom designed system controller for controlling the operations of the other hardware cells. The knowledge base 35 contains ASIC design expert knowledge required for data path synthesis and cell selection. Thus, with a functional flowchart input, PSCS generates a system controller, selects all other hardware cells, generates data and control paths, and generates a netlist describing all of this design information.

The KBSC system employs a hierarchal cell selection ASIC design approach, as is illustrated in FIG. 4. Rather than generating every required hardware cell from scratch, the system draws upon a cell library 34 of previously designed, tested and proven hardware cells of various types and of various functional capabilities with a given type. The macro library 23 contains a set of macros defining various actions which can be specified in the flowchart. For each macro function in the macro library 23 there may be several hardware cells in the cell library 34 of differing geometry and characteristics capable of performing the specified function. Using a rule based expert system with a knowledge base 35 extracted from expert ASIC designers, the KBSC system selects from the cell library 34 the optimum cell for carrying out the desired function.

Referring again to FIG. 3, the cells selected by the cell selector 32, the controller information generated by the controller generator 33 and the data and control paths generated by the data/control path synthesizer 31 are all utilized by the PSCS program 30 to generate the netlist 15. The netlist is a list which identifies each block in the circuit and the interconnections between the respective inputs and outputs of each block. The netlist provides all the necessary information required to produce the integrated circuit. Computer-aided design systems for cell placement and routing are commercially available which will receive netlist data as input and will lay out the respective cells in the chip, generate the necessary routing, and produce mask data which can be directly used by a chip foundry in the fabrication of integrated circuits.

System Requirements

The KBSC system can be operated on a suitable programed general purpose digital computer. By way of example, one embodiment of the system is operated in a work station environment such as Sun3 and VAXStation-II/GPX Running UNIX Operating System and X Window Manager. The work station requires a minimum of 8 megabytes of main storage and 20 megabytes of hard disk space. The monitor used is a color screen with 8-bit planes. The software uses C programming language and INGRES relational data base.

The human interface is mainly done by the use of pop up menus, buttons, and a special purpose command language. The permanent data of the integrated circuit design are stored in the data base for easy retrieval and update. Main memory stores the next data temporarily, executable code, design data (flowchart, logic, etc.), data base (cell library), and knowledge base. The CPU performs the main tasks of creating and simulating flowcharts and the automatic synthesis of the design.

Flowchart Example

To describe the mapping of a flowchart to a netlist, consider an example flowchart shown in FIG. 5, which is of part of a larger overall system. In this illustrative flowchart, two variables, VAL1 and VAL2 are compared and if they are equal, they are added together. In this instance, the first action (Action 1) involves moving the value of variable VALI to register A. The second action comprises moving the value of variable VAL2 to register B. Condition 1 comprises comparing the values in registers A and B. Action 3 comprises adding the values of registers A and B and storing the result in register C.

In producing an integrated circuit to carry out the function defined in FIG. 5, the KBSC maps the flowchart description of the behavior of the system to interconnection requirements between hardware cells. The hardware cells are controlled by a system controller which generates all control signals. There are two types of variables involved in a system controller:

(1) Input variables: These are generated by hardware cells, and/or are external input to the controller. These correspond to conditions in the flowchart.

(2) Output variables: These are generated by the system controller and correspond to actions in the flowchart.

FIG. 6 illustrates the results of mapping the flowchart of FIG. 5 onto hardware cells. The actions and the conditions in the flowchart are used for cell selection and data and control path synthesis. The VALI register and VAL2 register and the data paths leading therefrom have already been allocated in actions occurring before Action 1 in our example. Action 1 causes generation of the data register A. Similarly, Action 2 causes the allocation of data register B. The comparator is allocated as a result of the comparison operation in Condition 1. The comparison operation is accomplished by (1) selecting a comparator cell, (2) mapping the inputs of the comparator cell to registers A and B, (3) generating data paths to connect the comparator with the registers A and B and (4) generating input variables corresponding to equal to, greater than, and less than for the system controller. Similarly the add operation in Action 3 causes selection of the adder cell, mapping of the adder parameters to the registers and creating the data paths.

Following this methodology, a block list can be generated for a given flowchart. This block list consists of a system controller and as many other blocks as may be required for performing the necessary operations. The blocks are connected with data paths, and the blocks are controlled by the system controller through control paths. These blocks can be mapped to the cells selected from a cell library to produce a cell list.

Interactive Flowchart Editor and Simulator

The creation and verification of the flowchart is the first step in the VLSI design methodology. The translation from an algorithm to an equivalent flowchart is performed with the Flowchart Editor 21 (FIG. 3). The verification of the edited flowchart is performed by the Flowchart Simulator 22 The Flowchart Editor and Simulator are integrated into one working environment for interactive flowchart editing, with a designer friendly interface.

EDSIM is the program which contains the Flowchart Editor 21 and the Flowchart Simulator 22. It also provides functions such as loading and saving flow-

charts. EDSIM will generate an intermediate file, called a statelist, for each flowchart. This file is then used by the PSCS program 30 to generate a netlist.

Flowchart Editor

The Flowchart Editor 21 is a software module used for displaying, creating, and editing the flowchart. This module is controlled through the flowchart editing window illustrated in FIG. 7. Along with editing functions the Flowchart Editor also provides checking of design errors.

The following is a description of the operations of the Flowchart Editor. The main editing functions include, create, edit, and delete states, conditions, and transitions. The create operation allows the designer to add a new state, condition, or transitions to a flowchart. Edit allows the designer to change the position of a state, condition or transition, and delete allows the designer to remove a state, condition or transition from the current flowchart. States which contain actions are represented by boxes, conditions are represented by diamonds, and transitions are represented by lines with arrows showing the direction of the transition.

Edit actions allows the designer to assign actions to each box. These actions are made up of macro names and arguments. An example of arguments is the setting and clearing of external signals. A list of basic macros available in the macro library 23 is shown in Table 1.

TABLE 1

Macro	Description
ADD (A,B,C)	C = A + B
SUB (A,B,C)	C = A − B
MULT (A,B,C)	C = A * B
DIV (A,B,C)	C = A div B
DECR (A)	A = A − 1
INCR (A)	A = A + 1
CLR (A)	A = 0
REG (A,B)	B = A
CMP (A,B)	Compare A to B and set EQ,LT,GT signals
CMP0 (A)	Compare A to 0 and set EQ,LT,GT signals
NEGATE (A)	A = NOT (A)
MOD (A,B,C)	C = A Modulus B
POW (A,B,C)	C = A B
DC2 (A,S1,S2,S3,S4)	Decode A into S1,S2,S3,S4
EC2 (S1,S2,S3,S4,A)	Encode S1,S2,S3,S4 into A
MOVE (A,B)	B = A
CALL sub-flowchart (A,B, . . .)	Call a sub-flowchart. Pass A,B . . .
START (A,B, . . .)	Beginning state of a sub-flowchart
STOP (A,B . . .)	Ending state of a sub-flowchart

The Flowchart Editor also provides a graphical display of the flowchart as the Flowchart Simulator simulates the flowchart. This graphical display consists of boxes, diamonds, and lines as shown in FIG. 7. All are drawn on the screen and look like a traditional flowchart. By displaying the flowchart on the screen during simulation it allows the designer to design and verify the flowchart at the same time.

Flowchart Simulator

The Flowchart Simulator 22 is a software module used for simulating flowcharts. This module is controlled through the simulator window illustrated in FIG. 8. The Flowchart Simulator simulates the transitions between states and conditions in a flowchart. The following is a list of the operations of the Flowchart Simulator:

edit data—Change the value of a register or memory.
set state—Set the next state to be simulated.
set detail or summary display—Display summary or detail information during simulation.
set breaks—Set a breakpoint.
clear breaks—Clear all breakpoints.
show breaks—Display current breakpoints.
step—Step through one transition.
execute—Execute the flowchart.
stop—Stop executing of the flowchart. history ON or history OFF—Set history recording on or off.
cancel—Cancel current operation.
help—Display help screen.
close—Close the simulator window.

The results of the simulation are displayed within the simulator window. Also the editor window will track the flowchart as it is being simulated. This tracking of the flowchart makes it easy to edit the flowchart when an error is found.

Cell Selection

The Cell Selector 32 is a knowledge based system for selecting a set of optimum cells from the cell library 34 to implement a VLSI system. The selection is based on functional descriptions in the flowchart, as specified by the macros assigned to each action represented in the flowchart. The cells selected for implementing a VLSI system depend on factors such as cell function, fabrication technology used, power limitations, time delays etc. The cell selector uses a knowledge base extracted from VLSI design experts to make the cell selection.

To design a VLSI system from a flowchart description of a user application, it is necessary to match the functions in a flowchart with cells from a cell library. This mapping needs the use of artificial intelligence techniques because the cell selection process is complicated and is done on the basis of a number of design parameters and constraints. The concept used for cell selection is analogous to that used in software compilation. In software compilation a number of subroutines are linked from libraries. In the design of VLSI systems, a functional macro can be mapped to library cell.

FIG. 4 illustrates the concept of hierarchical cell selection. The cell selection process is performed in two steps:

(1) selection of functional macros
(2) selection of geometrical cells

A set of basic macros is shown in Table 1. A macro corresponds to an action in the flowchart. As an example, consider the operation of adding A and B and storing the result in C. This function is mapped to the addition macro ADD(X, Y, Z). The flowchart editor and flowchart simulator are used to draw the rectangles, diamonds and lines of the flowchart, to assign a macro selected from the macro library 23 to each action represented in the flowchart, and to verify the functions in flowcharts. The flowchart is converted into an intermediate form (statelist) and input to the Cell Selector.

The Cell Selector uses a rule based expert system to select the appropriate cell or cells to perform each action. If the cell library has a number of cells with different geometries for performing the operation specified by the macro, then an appropriate cell can be selected on the basis of factors such as cell function, process technology used, time delay, power consumption, etc.

The knowledge base of Cell Selector 32 contains information (rules) relating to:

(1) selection of macros
(2) merging two macros

(3) mapping of macros to cells
(4) merging two cells
(5) error diagnostics

The above information is stored in the knowledge base 35 as rules.

Cell List Generation

FIG. 9 shows the cell list generation steps. The first step of cell list generation is the transformation of the flowchart description into a structure that can be used by the Cell Selector. This structure is called the statelist. The blocklist is generated from the statelist by the inference engine. The blocklist contains a list of the functional blocks to be used in the integrated circuit. Rules of the following type are applied during this stage.

map arguments to data paths
map actions to macros
connect these blocks

Rules also provide for optimization and error diagnostics at this level.

The cell selector maps the blocks to cells selected from the cell library 34. It selects an optimum cell for a block. This involves the formulation of rules for selecting appropriate cells from the cell library. Four types of information are stored for each cell. These are:

(1) functional level information: description of the cell at the register transfer level.

(2) logic level information: description in terms of flip-flops and gates.

(3) circuit level information: description at the transistor level.

(4) Layout level information: geometrical mask level specification.

The attributes of a cell are:

cell name
description
function
width
height
status
technology
minimum delay
typical delay
maximum delay
power
file
designer
date
comment
inspector

In the cell selection process, the above information can be used. Some parameters that can be used to map macros to cells are:

(1) name of macro
(2) function to be performed
(3) complexity of the chip
(4) fabrication technology
(5) delay time allowed
(6) power consumption
(7) bit size of macro data paths

Netlist Generation

The netlist is generated after the cells have been selected by PSCS. PSCS also uses the macro definitions for connecting the cell terminals to other cells. PSCS uses the state-to-state transition information from an intermediate form representation of a flowchart (i.e. the statelist) to generate a netlist. PSCS contains the following knowledge for netlist generation:

(1) Data path synthesis
(2) Data path optimization
(3) Macro definitions
(4) Cell library
(5) Error detection and correction

The above information is stored in the knowledge base 35 as rules. Knowledge engineers help in the formulation of these rules from ASIC design experts. The macro library 23 and the cell library 34 are stored in a database of KBSC.

A number of operations are performed by PSCS. The following is a top level description of PSCS operations:

(1) Read the flowchart intermediate file and build a statelist.
(2) current_context=START
(3) Start the inference engine and load the current context rules.
(4) Perform one of the following operations depending upon current_context:
(a) Modify the statelist for correct implementation.
(b) Create blocklist, macrolist and data paths.
(c) Optimize blocklist and datapath list and perform error checks.
(d) Convert blocks to cells.
(e) Optimize cell list and perform error checks.
(f) Generate netlist.
(g) Optimize netlist and perform error checks and upon completion Goto 7.
(5) If current_context has changed, load new context rules.
(6) Goto 4.
(7) Output netlist file and stf files and Stop.

In the following sections, operations mentioned in step 4 are described. The Rule Language and PSCS display are also described.

Rule Language

The rule language of PSCS is designed to be declarative and to facilitate rule editing. In order to make the expert understand the structure of the knowledge base, the rule language provides means for knowledge representation. This will enable the format of data structures to be stated in the rule base, which will enable the expert to refer to them and understand the various structures used by the system. For example, the expert can analyze the structure of wire and determine its components. The expert can then refer these components into rules. If a new object has to be defined, then the expert can declare a new structure and modify some existing structure to link to this new structure. In this way, the growth of the data structures can be visualized better by the expert. This in turn helps the designer to update and append rules.

The following features are included in the rule language:

(i) Knowledge representation in the form of a record structure.
(ii) Conditional expressions in the antecedent of a rule.
(iii) Facility to create and destroy structure in rule actions.
(iv) The assignment statement in the action of a rule.
(v) Facility for input and output in rule actions.
(vi) Provide facility to invoke C functions from rule actions.

The rule format to be used is as follows:

The rule format to be used is as follows:		
Rule	<number> <context>	
If {		
	<if-clause>	
}		
Then	{	
	<then-clause>	
}		
where	<number>	rule number
	<context>	context in which this rule is active
	<if-clause>	the condition part of the rule
	<then-clause>	the action part of the rule

Inference Strategy

The inference strategy is based on a fast pattern matching algorithm. The rules are stored in a network and the requirement to iterate through the rules is avoided. This speeds up the execution. The conflict resolution strategy to be used is based on the following:

(1) The rule containing the most recent data is selected.

(2) The rule which has the most complex condition is selected.

(3) The rule declared first is selected.

Rule Editor

PSCS provides an interactive rule editor which enables the expert to update the rule set. The rules are stored in a database so that editing capabilities of the database package can be used for rule editing. To perform this operation the expert needs to be familiar with the various knowledge structures and the inferencing process. If this is not possible, then the help of a knowledge engineer is needed.

PSCS provides a menu from which various options can be set. Mechanisms are provided for setting various debugging flags and display options, and for the overall control of PSCS.

Facility is provided to save and display the blocklist created by the user. The blocklist configuration created by the user can be saved in a file and later be printed with a plotter. Also the PSCS display can be reset to restart the display process.

PSCS Example Rules:		
Rule 1		
	IF	no blocks exist
	THEN	generate a system controller.
Rule 2		
	IF	a state exists which has a macro AND this macro has not been mapped to a block
	THEN	find a corresponding macro in the library and generate a block for this macro.
Rule 3		
	IF	there is a transition between two states AND there are macros in these states using the same argument
	THEN	make a connection from a register corresponding to the first macro to another register corresponding to the second macro.
Rule 4		
	IF	a register has only a single connection from another register
	THEN	combine these registers into a single register.
Rule 5		
	IF	there are two comparators AND input data widths are of the same size AND one input of these is same AND the outputs of the comparators are used to perform the same operation.
	THEN	combine these comparators into a single comparator.
Rule 6		
	IF	there is a data without a register
	THEN	allocate a register for this data.
Rule 7		
	IF	all the blocks have been interconnected AND a block has a few terminals not connected
	THEN	remove the block and its terminals, or issue an error message.
Rule 8		
	IF	memory is to be used, but a block has not been created for it
	THEN	create a memory block with data, address, read and write data and control terminals.
Rule 9		
	IF	a register has a single connection to a counter
	THEN	combine the register and the counter; remove the register and its terminals.
Rule 10		
	IF	there are connections to a terminal of a block from many different blocks
	THEN	insert a multiplexor; remove the connections to the terminals and connect them to the input of the multiplexor; connect the output of the multiplexor to the input of the block.

Additional rules address the following points:
remove cell(s) that can be replaced by using the outputs of other cell(s)
reduce multiplexor trees
use fan-out from the cells, etc.

Soft Drink Vending Machine Controller Design Example

The following example illustrates how the previously described features of the present invention are employed in the design of an application specific integrated circuit (ASIC). In this illustrative example the ASIC is designed for use as a vending machine controller. The vending machine controller receives a signal each time a coin has been deposited in a coin receiver. The coin value is recorded and when coins totalling the correct amount are received, the controller generates a signal to dispense a soft drink. When coins totalling more than the cost of the soft drink are received, the controller dispenses change in the correct amount.

This vending machine controller example is patterned after a textbook example used in teaching digital system controller design. See Fletcher, William I., *An Engineering Approach to Digital Design*, Prentice-Hall, Inc., pp. 491–505. Reference may be made to this textbook example for a more complete explanation of this vending machine controller requirements, and for an understanding and appreciation of the complex design procedures prior to the present invention for designing the hardware components for a controller.

FIG. **10** illustrates a flowchart for the vending machine controller system. This flowchart would be entered into the KBSC system by the user through the flowchart editor. Briefly reviewing the flowchart, the controller receives a coin present signal when a coin is received in the coin receiver. State0 and cond0 define a waiting state awaiting deposit of a coin. The symbol CP represents "coin present" and the symbol !CP repre-

sents "coin not present". Statel and condI determine when the coin has cleared the coin receiver. At state20, after receipt of a coin, the macro instruction ADD3.1 (lc, cv, sum) instructs the system to add lc (last coin) and cv (coin value) and store the result as sum. The macro instruction associated with state21 moves the value in the register sum to cv. The macro CMP.1 at state22 compares the value of cv with PR (price of soft drink) and returns signals EQ, GT and LT. The condition cond2 tests the result of the compare operation CMP.1. If the result is "not greater than" (!GT.CMP.1), then the condition cond3 tests to see whether the result is "equal" (EQ.CMP.1). If the result is "not equal" (!EQ.CMP.1), then control is returned to state0 awaiting the deposit of another coin. If cond3 is EQ, then state4 generates a control signal to dispense a soft drink (droppop) and the macro instruction CLR.1(cv) resets cv to zero awaiting another customer.

If the total coins deposited exceed the price, then state30 produces the action "returncoin". Additionally, the macro DECR.1 (cv) reduces the value of cv by the amount of the returned coin. At state31 cv and PR are again compared. If cv is still greater than PR, then control passes to state30 for return of another coin. The condition cond5 tests whether the result of CMP.2 is EQ and will result in either dispensing a drink (droppop) true or branching to state0 awaiting deposit of another coin. The macros associated with the states shown in FIG. 10 correspond to those defined in Table 1 above and define the particular actions which are to be performed at the respective states.

Appendix A shows the intermediate file or "statelist" produced from the flowchart of FIG. 10. This statelist is produced as output from the EDSIM program 20 and is used as input to the PSCS program 30 (FIG. 3).

FIG. 11 illustrates for each of the macros used in the flowchart of FIG. 10, the corresponding hardware blocks. It will be seen that the comparison macro CMP (A,B) results in the generation of a register for storing value A, a register for storing value B, and a comparator block and also produces control paths to the system controller for the EQ, LT, and GT signals generated as a result of the comparison operation. The addition macro ADD (A,B,C) results in the generation of a register for each of the input values A and B, a register for the output value C, and in the generation of an adder block. The macro DECR (A) results in the generation of a counter block. The PSCS program 30 maps each of the macros used in the flowchart of FIG. 10 to the corresponding hardware components results in the generation of the hardware blocks shown in FIG. 12. In generating the illustrated blocks, the PSCS program 30 relied upon rules 1 and 2 of the above listed example rules.

FIG. 13 illustrates the interconnection of the block of FIG. 12 with data paths and control paths. Rule 3 was used by the data/control path synthesizer program 31 in mapping the data and control paths.

FIG. 14 shows the result of optimizing the circuit by applying rule 4 to eliminate redundant registers. As a result of application of this rule, the registers R2, R3, R7, R8, and R9 in FIG. 13 were removed. FIG. 15 shows the block diagram after further optimization in which redundant comparators are consolidated. This optimization is achieved in the PSCS program 30 by application of rule 5.

Having now defined the system controller block, the other necessary hardware blocks and the data and control paths for the integrated circuit, the PSCS program 30 now generates a netlist 15 defining these hardware components and their interconnection requirements. From this netlist the mask data for producing the integrated circuit can be directly produced using available VLSI CAD tools.

```
name rpop;
data path @ic<0:5>, cv<0:5>, sum<0:5>, @pr<0:5>;
{
state4 : state0;
state30 : state31;
state21 : state22;
state20 : state21;
state0 :. !cp state0;
state0 :. cp state1;
state1 :. cp state1;
state1 :. !cp state20;
state22 :. GT.CMP.1 state30;
state22 :. !GT.CMP.1*EQ.CMP.1 state4;
state22 :. !GT.CMP.1*!EQ.CMP.1 state0;
state31 :. GT.CMP.2 state30;
state31 :. !GT.CMP.2*EQ.CMP.2 state4;
state31 :. !GT.CMP.2*!EQ.CMP.2 state0;
state30 :: returncoin;
state30 = DECR.1(cv);
state4 :: droppop;
state4 = CLR.1(cv);
state31 = CMP.2(cv,pr);
state22 = CMP.1(cv,pr);
state21 = MOVE.1(sum,cv);
state20 = ADD3.1(ic,cv,sum);
}
```

That which I claimed is:

1. A computer-aided design system for designing an application specific integrated circuit directly from architecture independent functional specifications for the integrated circuit, comprising

a macro library defining a set of architecture independent operations comprised of actions and conditions;

input specification means operable by a user for defining architecture independent functional specifications for the integrated circuit, said functional specifications being comprised of a series of operations comprised of actions and conditions, said input specification means including means to permit the user to specify for each operation a macro selected from said macro library;

a cell library defining a set of available integrated circuit hardware cells for performing the available operations defined in said macro library;

cell selection means for selecting from said cell library for each macro specified by said input specification means, appropriate hardware cells for performing the operation defined by the specified macro, said cell selection means comprising an expert system including a knowledge base containing rules for. selecting hardware cells from said cell library and inference engine means for selecting appropriate hardware cells from said cell library in accordance with the rules of said knowledge base; and

netlist generator means cooperating with said cell selection means for generating as output from the system a netlist defining the hardware cells which are needed to achieve the functional requirements of the integrated circuit and the connections therebetween.

2. The system as defined in claim 1 wherein said input means comprises means specification for receiving user

input of a list defining the series of actions and conditions.

3. The system as defined in claim 1 additionally including mask data generator means for generating from said netlist the mask data required to produce an integrated circuit having the specified functional requirements.

4. The system as defined in claim 1 wherein said input means comprises flowchart editor means specification for creating a flowchart having elements representing said series of actions and conditions.

5. The system as defined in claim 4 additionally including flowchart simulator means for simulating the functions defined in the flowchart to enable the user to verify the operation of the integrated circuit.

6. The system as defined in claim 1 additionally including data path generator means cooperating with said cell selection means for generating data paths for the hardware cells selected by said cell selection means.

7. The system as defined in claim 6 wherein said data path generator means comprises a knowledge base containing rules for selecting data paths between hardware cells and inference engine means for selecting data paths between the hardware cells selected by said cell selection means in accordance with the rules of said knowledge base and the arguments of the specified macros.

8. The system as defined in claim 6 additionally including control generator means for generating a controller and control paths for the hardware cells selected by said cell selection means.

9. A computer-aided design system for designing an application specific integrated circuit directly from a flowchart defining architecture independent functional requirements of the integrated circuit comprising

a marco library defining a set of architecture independent operations comprised of actions and conditions;

flowchart editor means operable by a user for creating a flowchart having elements representing said architecture independent operations;

said flowchart editor means including macro specification means for permitting the user to specify for each operation represented in the flowchart a macro selected from said macro library;

a cell library defining a set of available integrated circuit hardware cells for performing the available operations defined in said macro library;

cell selection means for selecting form said cell library for each specified macro, appropriate hardware cells for performing the operation defined by the specified macro, said cell selection means comprising an expert system including a knowledge base containing rules for selecting hardware cells from said cell library and inference engine means for selecting appropriate hardware cells from said cell library in accordance with the rules of said knowledge base; and

data path generator means cooperating with said cell selection means for generating data paths for the hardware cells selected by said cell selector means, said data path generator means comprising a knowledge base containing rules for selecting data paths between hardware cells and inference engine means for selecting data paths between hardware cells selected by said cell selection means in accordance with the rules of said knowledge base and the arguments of the specified macros.

10. The system as defined in claim 9 additionally including control generator means for generating a controller and control paths for the hardware cells selected by said cell selection means.

11. A computer-aided design system for designing an application specific integrated circuit directly from a flowchart defining architecture independent functional requirements of the integrated circuit, comprising

flowchart editor means operable by a user for creating a flowchart having boxes representing architecture independent actions, diamonds representing architecture independent conditions, and lines with arrows representing transitions between actions and condition and including means for specifying for each box or diamond, a particular action or condition to be performed;

a cell library defining a set of available integrated circuit hardware cells for performing actions and conditions;

a knowledge base containing rules for selecting hardware cells from said cell library and for generating data and control paths for hardware cells; and

expert system means operable with said knowledge base for translating the flowchart defined by said flowchart editor means into a netlist defining the necessary hardware cells and data and control paths required in an integrated circuit having the specified functional requirements.

12. The system as defined in claim 11 including mask data generator means for generating from said netlist the mask data required to produce an integrated circuit having the specified functional requirements.

13. A computer-aided design process for designing an application specific integrated circuit which will perform a desired function comprising

storing a set of definitions of architecture independent actions and conditions;

storing data describing a set of available integrated circuit hardware cells for performing the actions and conditions defined in the stored set;

storing in an expert system knowledge base a set of rules for selecting hardware cells to perform the actions and conditions;

describing for a proposed application specific integrated circuit a series of architecture independent actions and conditions;

specifying for each described action and condition of the series one of said stored definitions which corresponds to the desired action or condition to be performed; and

selecting from said stored data for each of the specified definitions a corresponding integrated circuit hardware cell for performing the desired function of the application specific integrated circuit, said step of selecting a hardware cell comprising applying to the specified definition of the action or condition to be performed, a set of cell selection rules stored in said expert system knowledge base and generating for the selected integrated circuit hardware cells, a netlist defining the hardware cells which are needed to perform the desired function of the integrated circuit and the interconnection requirements therefor.

14. A process as defined in claim 13, including generating from the netlist the mask data required to produce an integrated circuit having the desired function.

15. A process as defined in claim 13 including the further step of generating data paths for the selected integrated circuit hardware cells.

16. A process as defined in claim 15 wherein said step of generating data paths comprises applying to the selected cells a set of data path rules stored in a knowledge base and generating the data paths therefrom.

17. A process as defined in claim 16 including the further step of generating control paths for the selected integrated circuit hardware cells.

18. A knowledge based design process for designing an application specific integrated circuit which will perform a desired function comprising

storing in a macro library a set of macros defining architecture independent actions and conditions;

storing in a cell library a set of available integrated circuit hardware cells for performing the actions and conditions;

storing in a knowledge base set of rules for selecting hardware cells from said cell library to perform the actions and conditions defined by the stored macros;

describing for a proposed application specific integrated circuit a flowchart comprised of elements representing a series of architecture independent actions and conditions which carry out the function to be performed by the integrated circuit;

specifying for each described action and condition of said series a macro selected from the macro library which corresponds to the action or condition; and

applying rules of said knowledge base to the specified macros to select from said cell library the hardware cells required for performing the desired function of the application specific integrated circuit and generating for the selected integrated circuit hardware cells, a netlist defining the hardware cells which are needed to perform the desired function of the integrated circuit and the interconnection requirements therefor.

19. A process as defined in claim 18 also including the steps of

storing in said knowledge base a set of rules for creating data paths between hardware cells, and

applying rules of said knowledge base to the specified means to create data paths for the selected hardware cells.

20. A process as defined in claim 19 also including the steps of generating a controller and generating control paths for the selected hardware cells.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 4,922,432 Page 1 of 4

DATED : May 1, 1990

INVENTOR(S) : Hideaki Kobayashi, et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

ON TITLE PAGE: under the section "References Cited" under "Other Publications":

"Verifying Compiled Silicon", by E. K. cheng, VLSI Design, Oct. 1984, pp. 1-4." should be -- "Verifying Compiled Silicon", by E. K. Cheng, VLSI Design, Oct. 1984, pp. 1-4." --.

"quality of Designs from An Automatic Logic Generator", by T. D. Friedman et al., IEEE 7th DA Conference, 1970, pp. 71-89." should be -- "Quality of Designs from An Automatic Logic Generator", by T. D. Friedman et al., IEEE 7th DA Conference, 1970, pp. 71-89. --.

"Trevillyan-Trickey, H., Flamel: *A High Level Hardward Compiler*, IEEE Transactions On Computer Aided Design, Mar. 1987, pp. 259-269." should be -- Trevillyan-Trickey, H., Flamel: *A High Level Hardware Compiler*, IEEE Transactions On Computer Aided Design, Mar. 1987, pp. 259-269. --.

In the abstract:

Every occurrence of "functional architecture independent" should be -- architecture independent functional --.

Column 1, line 19, "a" should be -- an --.

[redacted]

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 4,922,432

DATED : May 1, 1990

INVENTOR(S) : Hideaki Kobayashi, et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 2, line 10, "functional architecture independent" should be -- architecture independent functional --.

Column 2, line 21, "functional architecture independent" should be -- architecture independent functional --.

Column 2, lines 29-30, "functional architecture independent" should be -- architecture independent functional --.

Column 2, line 31, "structural" should be after "specific".

Column 3, lines 51-52, "representation" should be after "architecture independent".

Column 3, lines 61-62, "integrated" should be after "specific".

Column 6, line 62, after "22" insert -- . --.

Column 7, line 43 (in Table 1), "C = A B" should be -- C = A^B --.

Column 8, line 9 should end with the word "flowchart" and "history" should begin on the next line.

[redacted]

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 4,922,432

DATED : May 1, 1990

INVENTOR(S) : Hideaki Kobayashi, et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 10, line 23, "data paths" should be -- datapaths --.

Column 10, line 68, delete "The rule format to be used is as follows:".

Column 12, line 54, "Enqineering" should be -- Engineering --.

Column 13, line 55, "block" should be -- blocks --.

In the Claims:

Column 14, line 68, before "means" (first occurrence) insert -- specification --; after "means" (second occurrence) delete "specification".

Column 15, line 9, before "means" (first occurrence) insert -- specification --; after "means" (second occurrence) delete "specification".

Column 15, line 35, after "circuit" insert -- , --.

Column 15, line 36, "marco" should be -- macro --.

Column 15, line 49, "form" should be -- from --.

[redacted]

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 4,922,432 Page 4 of 4

DATED : May 1, 1990

INVENTOR(S) : Hideaki Kobayashi, et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 16, line 14, "condition" should be
-- conditions --.

Column 17, line 19, after "base" insert -- a --.

Signed and Sealed this

Fourteenth Day of January, 1992

Attest:

Attesting Officer

HARRY F. MANBECK, JR.

Commissioner of Patents and Trademarks

[redacted]

JS 44

CIVIL COVER SHEET

The JS-44 civil cover sheet and the information contained herein neither replace nor supplement the filing and service of pleadings or other papers as required by law, except as provided by local rules of court. This form, approved by the Judicial Conference of the United States in September 1974 (is required for the use of the Clerk of Court for the purpose of initiating the civil docket sheet. (SEE INSTRUCTIONS ON THE REVERSE OF THE FORM.)

03 109

I.(a) PLAINTIFF
RICOH COMPANY, LTD.

(b) COUNTY OF RESIDENCE OF FIRST LISTED PLAINTIFF Tokyo, Japan
(EXCEPT IN U.S. PLAINTIFF CASES)

DEFENDANTS
AEROFLEX INCORPORATED, AMI SEMICONDUCTOR, INC., MATROX ELECTRONIC SYSTEMS, LTD., MATROX GRAPHICS INC., MATROX INTERNATIONAL CORP. and MATROX TECH, INC.

COUNTY OF RESIDENCE OF FIRST LISTED DEFENDANT _____
(IN U.S. PLAINTIFF CASES ONLY)

NOTE: IN LAND CONDEMNATION CASES, USE THE LOCATION OF THE TRACT OF LAND INVOLVED.

(c) ATTORNEYS (FIRM NAME, ADDRESS, AND TELEPHONE NUMBER)
Robert W. Whetzel
Richards, Layton & Finger
One Rodney Square, P.O. Box 551
Wilmington, DE 19899
(302) 651-7700

ATTORNEYS (IF KNOWN)

2003 JAN 21 P 2:25 CLERK U.S. DISTRICT COURT DISTRICT OF DELAWARE

II. BASIS OF JURISDICTION (PLACE AN X IN ONE BOX ONLY)

- ☐ 1 U.S. Government Plaintiff
- ☒ 3 Federal Question (U.S. Government Not a Party)
- ☐ 2 U.S. Government Defendant
- ☐ 4 Diversity (Indicate Citizenship of Parties in Item III)

III. CITIZENSHIP OF PRINCIPAL PARTIES (For Diversity Cases Only)
(PLACE AN "X" IN ONE BOX FOR PLAINTIFF AND ONE BOX FOR DEFENDANT)

	PTF	DEF		PTF	DEF
Citizen of This State	☐ 1	☐ 1	Incorporated *or* Principal Place of Business in This State	☐ 4	☐ 4
Citizen of Another State	☐ 2	☐ 2	Incorporated *and* Principal Place of Business in Another State	☐ 5	☐ 5
Citizen or Subject of a Foreign Country	☐ 3	☐ 3	Foreign Nation	☐ 6	☐ 6

IV. NATURE OF SUIT (PLACE AN X IN ONE BOX ONLY)

CONTRACT
- ☐ 110 Insurance
- ☐ 120 Marine
- ☐ 130 Miller Act
- ☐ 140 Negotiable Instrument
- ☐ 150 Recovery of Overpayment & Enforcement of Judgment
- ☐ 151 Medicare Act
- ☐ 152 Recovery of Defaulted Student Loans (excl. Veterans)
- ☐ 153 Recovery of Overpayment of Veteran's Benefits
- ☐ 160 Stockholders Suits
- ☐ 190 Other Contract
- ☐ 195 Contract Product Liability

REAL PROPERTY
- ☐ 210 Land Condemnation
- ☐ 220 Foreclosure
- ☐ 230 Rent Lease & Ejectment
- ☐ 240 Torts to Land
- ☐ 245 Tort Product Liability
- ☐ 290 All Other Real Property

TORTS

PERSONAL INJURY
- ☐ 310 Airplane
- ☐ 315 Airplane Product Liability
- ☐ 320 Assault, Libel & Slander
- ☐ 330 Federal Employers' Liability
- ☐ 340 Marine
- ☐ 345 Marine Product Liability
- ☐ 350 Motor Vehicle
- ☐ 355 Motor Vehicle Product Liability
- ☐ 360 Other Personal Injury

PERSONAL INJURY
- ☐ 362 Personal Injury - Med. Malpractice
- ☐ 365 Personal Injury - Product Liability
- ☐ 368 Asbestos Personal Injury Product Liability

PERSONAL PROPERTY
- ☐ 370 Other Fraud
- ☐ 371 Truth In Lending
- ☐ 380 Other Personal Property Damage
- ☐ 385 Property Damage Product Liability

CIVIL RIGHTS
- ☐ 441 Voting
- ☐ 442 Employment
- ☐ 443 Housing/ Accommodations
- ☐ 444 Welfare
- ☐ 440 Other Civil Rights

PRISONER PETITIONS
- ☐ 510 Motions to Vacate Sentence

HABEAS CORPUS:
- ☐ 530 General
- ☐ 535 Death Penalty
- ☐ 540 Mandamus & Other
- ☐ 550 Civil Rights
- ☐ 555 Prison Condition

FORFEITURE/PENALTY
- ☐ 610 Agriculture
- ☐ 620 Other Food & Drug
- ☐ 625 Drug Related Seizure of Property 21 USC 881
- ☐ 630 Liquor Laws
- ☐ 640 R.R. & Truck
- ☐ 650 Airline Regs.
- ☐ 660 Occupational Safety/Health
- ☐ 690 Other

LABOR
- ☐ 710 Fair Labor Standards Act
- ☐ 720 Labor/Mgmt. Relations
- ☐ 730 Labor/Mgmt. Reporting & Disclosure Act
- ☐ 740 Railway Labor Act
- ☐ 790 Other Labor Litigation
- ☐ 791 Empl. Ret. Inc. Security Act

BANKRUPTCY
- ☐ 422 Appeal 28 USC 158
- ☐ 423 Withdrawal 28 USC 157

PROPERTY RIGHTS
- ☐ 820 Copyrights
- ☒ 830 Patent
- ☐ 840 Trademark

SOCIAL SECURITY
- ☐ 861 HIA (1395ff)
- ☐ 862 Black Lung (923)
- ☐ 863 DIWC/DIWW (405(g))
- ☐ 864 SSID Title XVI
- ☐ 865 RSI (405(g))

FEDERAL TAX SUITS
- ☐ 870 Taxes (U.S. Plaintiff or Defendant)
- ☐ 871 IRS - Third Party 26 USC 7609

OTHER STATUTES
- ☐ 400 State Reappointment
- ☐ 410 Antitrust
- ☐ 430 Banks and Banking
- ☐ 450 Commerce/ICC Rates/etc.
- ☐ 460 Deportation
- ☐ 470 Racketeer Influenced and Corrupt Organizations
- ☐ 810 Selective Service
- ☐ 850 Securities/Commodities/ Exchange
- ☐ 875 Customer Challenge 12 USC 3410
- ☐ 891 Agricultural Acts
- ☐ 892 Economic Stabilization Act
- ☐ 893 Environmental Matters
- ☐ 894 Energy Allocation Act
- ☐ 895 Freedom of Information Act
- ☐ 900 Appeal of Fee Determination Under Equal Access to Justice
- ☐ 950 Constitutionality of State Statutes
- ☐ 890 Other Statutory Actions

V. ORIGIN (PLACE AN "X" IN ONE BOX ONLY)

☒ 1 Original Proceeding ☐ 2 Removed from State Court ☐ 3 Remanded from Appellate Court ☐ 4 Reinstated or Reopened ☐ 5 Transferred from another district (specify) ☐ 6 Multidistrict Litigation ☐ 7 Appeal to District Judge from Magistrate Judgment

VI. CAUSE OF ACTION (CITE THE U.S. CIVIL STATUTE UNDER WHICH YOU ARE FILING AND WRITE A BRIEF STATEMENT OF CAUSE. DO NOT CITE JURISDICTIONAL STATUTES UNLESS DIVERSITY.)

Action for patent infringement pursuant to 35 U.S.C. § 271, et seq.

VII. REQUESTED IN COMPLAINT: CHECK IF THIS IS A **CLASS ACTION** ☐ Under F.R.C.P. 23 **DEMAND $** CHECK YES only if demanded in complaint: **JURY DEMAND:** ☐ YES ☒ NO

RELATED CASE(S) IF ANY (see instructions): Judge _____ Docket Number _____

DATE 1/21/03 SIGNATURE OF ATTORNEY OF RECORD Robert W. Whetzel by SLB 4025

FOR OFFICE USE ONLY

RECEIPT # _____ AMOUNT _____ APPLYING IFP _____ JUDGE _____ MAG. JUDGE _____

RLF1-2551246-1

EXHIBIT 2

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

RICOH COMPANY, LTD. Plaintiff, v. AEROFLEX INCORPORATED, AMI SEMICONDUCTOR, INC., MATROX ELECTRONIC SYSTEMS LTD., MATROX GRAPHICS INC., MATROX INTERNATIONAL CORP., and MATROX TECH, INC., Defendants.	C.A. No. 03-103-GMS DEMAND FOR JURY TRIAL

AMENDED ANSWER AND COUNTERCLAIMS OF DEFENDANT AEROFLEX INC. TO COMPLAINT FOR PATENT INFRINGEMENT

Defendant Aeroflex Inc. ("Aeroflex") for its Amended Answer to the Complaint and for its Counterclaims, hereby responds to the numbered paragraphs of the Complaint filed by Ricoh Company, Ltd. ("Ricoh"), and in doing so denies the allegations of the Complaint except as specifically stated:

PARTIES

1. Upon information and belief, Aeroflex admits that plaintiff Ricoh is a corporation organized under the laws of Japan and maintains its principal place of business at 3-6 1-chome, Nakamagome, Tokyo, Japan.

2. Aeroflex admits that Aeroflex is a corporation organized under the laws of Delaware, maintains its principal place of business at 35 S. Service Road, Plainview, NY, 11803, and has appointed The Corporation Trust Company, Corporation Trust Center, 1209 Orange Street, Wilmington, DE 19801 as its registered agent in Delaware.

3. Aeroflex lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 3, and on that basis, denies those allegations.

4. Aeroflex lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 4, and on that basis, denies those allegations.

5. Aeroflex lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 5, and on that basis, denies those allegations.

6. Aeroflex lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 6, and on that basis, denies those allegations.

7. Aeroflex lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 7, and on that basis, denies those allegations.

JURISDICTION

8. Aeroflex admits that plaintiff's claim purports to arise under the patent laws of the United States, Title 35, and more particularly under 35 U.S.C. §§ 271 et. seq. Except as expressly admitted, Aeroflex denies the allegations of Paragraph 8 of the Complaint.

9. Aeroflex admits that the Court has subject matter jurisdiction over the allegations of patent infringement in the Complaint pursuant to 28 U.S.C. §§ 1338(a) and 1331. Except as expressly admitted, Aeroflex denies the allegations of Paragraph 9 of the Complaint.

10. Aeroflex admits that the Court has personal jurisdiction over Aeroflex. Except as expressly admitted, Aeroflex denies the allegations of Paragraph 10 of the Complaint.

VENUE

11. Aeroflex admits that venue is proper in this judicial district pursuant to 28 U.S.C. § 1391. Except as expressly admitted, Aeroflex denies the allegations of Paragraph 11 of the Complaint.

FACTUAL BACKGROUND

12. Aeroflex admits that United States Patent No. 4,922,432 ("the '432 Patent") entitled "Knowledge Based Method and Apparatus for Designing Integrated Circuits using Functional Specifications," issued on May 1, 1990. Aeroflex admits that the '432 Patent names Hideaki Kobayashi and Masahiro Shindo as inventors. Aeroflex further admits that a copy of the '432

Patent is attached to the Complaint as Exhibit 1. Except as expressly admitted, Aeroflex denies the allegations of Paragraph 12 of the Complaint.

13. Aeroflex lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 13, and on that basis, denies those allegations.

14. Aeroflex lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 14, and on that basis, denies those allegations.

PATENT INFRINGEMENT

COUNT 1

15. Aeroflex repeats its responses to the allegations in Paragraphs 1 through 14 of the Complaint.

16. Aeroflex denies each and every allegation in Paragraph 16 of the Complaint.

17. Aeroflex denies each and every allegation of Paragraph 17 of the Complaint.

18. Aeroflex denies each and every allegation of Paragraph 18 of the Complaint.

19. Aeroflex denies each and every allegation of Paragraph 19 of the Complaint.

20. Aeroflex denies each and every allegation of Paragraph 20 of the Complaint.

COUNT 2

21. Aeroflex repeats its responses to the allegations in Paragraphs 1 through 14 of the Complaint.

22. Aeroflex lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 22, and on that basis, denies those allegations.

23. Aeroflex lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 23, and on that basis, denies those allegations.

24. Aeroflex lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 24, and on that basis, denies those allegations.

25. Aeroflex lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 25, and on that basis, denies those allegations.

26. Aeroflex lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 26, and on that basis, denies those allegations.

COUNT 3

27. Aeroflex repeats its responses to the allegations in Paragraphs 1 through 14 of the Complaint.

28. Aeroflex lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 28, and on that basis, denies those allegations.

29. Aeroflex lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 29, and on that basis, denies those allegations.

30. Aeroflex lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 30, and on that basis, denies those allegations.

31. Aeroflex lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 31, and on that basis, denies those allegations.

32. Aeroflex lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 32, and on that basis, denies those allegations.

COUNT 4

33. Aeroflex repeats its responses to the allegations in Paragraphs 1 through 14 of the Complaint.

34. Aeroflex lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 34, and on that basis, denies those allegations.

35. Aeroflex lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 35, and on that basis, denies those allegations.

36. Aeroflex lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 36, and on that basis, denies those allegations.

37. Aeroflex lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 37, and on that basis, denies those allegations.

38. Aeroflex lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 38, and on that basis, denies those allegations.

COUNT 5

39. Aeroflex repeats its responses to the allegations in Paragraphs 1 through 14 of the Complaint.

40. Aeroflex lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 40, and on that basis, denies those allegations.

41. Aeroflex lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 41, and on that basis, denies those allegations.

42. Aeroflex lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 42, and on that basis, denies those allegations.

43. Aeroflex lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 43, and on that basis, denies those allegations.

44. Aeroflex lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 44, and on that basis, denies those allegations.

COUNT 6

45. Aeroflex repeats its responses to the allegations in Paragraphs 1 through 14 of the Complaint.

46. Aeroflex lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 46, and on that basis, denies those allegations.

47. Aeroflex lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 47, and on that basis, denies those allegations.

48. Aeroflex lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 48, and on that basis, denies those allegations.

49. Aeroflex lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 49, and on that basis, denies those allegations.

50. Aeroflex lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 50, and on that basis, denies those allegations.

DEFENSES

In further response to the Complaint, Defendant Aeroflex asserts the following:

FIRST AFFIRMATIVE DEFENSE: INVALIDITY

51. The '432 Patent is invalid for failure to meet the requirements specified in Title 35 of the United States Code, including, but not limited to, 35 U.S.C. §§ 101, 102, 103, and 112 for one or more of the following reasons: (a) the inventor named in the '432 Patent did not invent or discover any new useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof within the meaning of 35 U.S.C. § 101; (b) the subject matter claimed in the '432 Patent was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before it was invented by the inventors named in the '432 Patent, as prohibited by 35 U.S.C. § 102(a); (c) the subject matter claimed in the '432 Patent was patented or described in a printed publication in this or a foreign country or was in public use or on sale in this country, more than one year prior to the filing of the application which resulted in the '432 Patent in the United States, as prohibited by 35 U.S.C. § 102(b); (d) the subject matter claimed in the '432 Patent was described in a United States patent based on an application filed in the United States or described in an application published prior to its invention by the inventors named in the '432 Patent, as prohibited by 35 U.S.C. § 102(e); (e) the inventor named in the '432 Patent did not invent the subject matter; (f) the subject matter claimed in the '432 Patent was invented in this country by another inventor, who did not abandon, suppress or conceal it, before its invention by the inventors named in the '432 Patent, as prohibited by 35 U.S.C. § 102(g); (g) the subject matter claimed in the '432 Patent would have been obvious, in view of the prior art, to a person having ordinary skill in the art at the time the invention was made under 35 U.S.C. § 103; and/or (h) the claims of the '432 Patent are invalid for failing to comply with 35 U.S.C. § 112, in that (i) the specification fails to contain a written description of the subject matter claimed in the '432 Patent and the manner and process of

making and using it; (ii) the claims fail to particularly point out and distinctly claim a patentable invention, (iii) the claims are indefinite, (iv) the specification fails to enable one skilled in the art to practice the claimed invention, and/or (v) the specification fails to set forth the best mode contemplated by the named inventors for carrying out the alleged invention. Defendant reserves the right to amend this defense further, as additional information is developed through discovery or otherwise.

SECOND AFFIRMATIVE DEFENSE: NONINFRINGEMENT

52. Aeroflex has not made, used, offered to sell or sold, within the United Sates, or imported into the United States, any products or processes that infringe any valid claim of the '432 Patent, either directly, indirectly, contributorily or otherwise, and has not induced others to infringe the '432 Patent.

THIRD AFFIRMATIVE DEFENSE: LACHES

53. Plaintiff is barred from recovery of damages by reason of laches.

RESERVATION OF AFFIRMATIVE DEFENSES

54. With discovery still ongoing, Aeroflex has yet to complete its investigation. Aeroflex reserves the right to assert any other defenses that discovery may reveal, including unclean hands and inequitable conduct.

COUNTERCLAIMS

Counterplaintiff Aeroflex Inc. ("Aeroflex"), for its counterclaims against Counterdefendant Ricoh Company, Ltd. ("Ricoh"), alleges as follows:

PARTIES

55. Aeroflex is a corporation organized under the laws of Delaware, having its principal place of business at 35 S. Service Road, Plainview, NY 11803.

56. Upon information and belief, Ricoh is a corporation organized under the laws of Japan, having its principal place of business at 3-6 1-chome, Nakamagome, Tokyo, Japan.

JURISDICTION AND VENUE

57. Counts 1 through 2 of the counterclaims are based upon the Patent Laws of the United States, Title 35 of the United States Code, §1 *et seq*. The Court has jurisdiction over the counterclaims pursuant to 28 U.S.C. §§ 1331, 1338(a), 2201, and 2202.

58. Ricoh has submitted to the personal jurisdiction of this Court.

59. Venue is proper in this district pursuant to 28 U.S.C. § 1391, because suit was filed in this district by Counterdefendant Ricoh. Venue is also proper in the District of Delaware because the causes of action against Counterdefendant arose in this judicial district.

60. There is an actual justiciable case or controversy between Aeroflex and Ricoh, in this district, arising under the Patent Laws, 35 U.S.C. § 1 *et seq*. This case or controversy arises by virtue of Ricoh's filing of this suit which purports to allege that Aeroflex infringes U.S. Patent No. 4,922,432 ("the '432 Patent") and Aeroflex' Answer thereto, which asserts the invalidity and noninfringement of the '432 Patent.

COUNT 1

DECLARATORY JUDGMENT OF INVALIDITY

61. Aeroflex incorporates by reference Paragraphs 55-60 as though fully set forth herein.

62. The '432 Patent, entitled "Knowledge Based Method and Apparatus for Designing Integrated Circuits using Functional Specifications" issued on May 1, 1990. Ricoh purports to be the owner of the '432 Patent.

63. Ricoh has sued Aeroflex in the present action, alleging infringement of the '432 Patent.

64. Based on Paragraph 51 above, which is specifically incorporated by reference into this Paragraph, the '432 Patent is invalid.

65. Aeroflex requests declaratory judgment that the '432 Patent is invalid.

COUNT 2

DECLARATORY JUDGMENT OF NONINFRINGEMENT

66. Aeroflex incorporates by reference Paragraphs 55-60 and 62-63 into this count as though fully set forth herein.

67. Based on Paragraph 52 above, which is specifically incorporated by reference into this Paragraph, the '432 Patent is not infringed by Aeroflex.

68. Aeroflex requests declaratory judgment that Aeroflex has not infringed the '432 Patent.

RESERVATION OF COUNTERCLAIMS

69. Aeroflex reserves the right to assert any other counterclaims that discovery may reveal, including, but not limited to, claims arising out of false or misleading statements to the public and/or customers.

PRAYER FOR RELIEF

WHEREFORE, Aeroflex respectfully prays for the following relief:

A. that this Court deny and all relief requested by Plaintiff in its Complaint and any relief whatsoever, and that the Complaint be dismissed with prejudice;

B. that this Court declare the '432 Patent invalid;

C. that this Court declare the '432 Patent unenforceable;

D. that this Court declare that Aeroflex has not infringed any valid claim of the '432 Patent;

E. that this Court declare the case to be exceptional pursuant to § 285 and that costs of this action and attorneys' fees be awarded to Aeroflex;

F. that this Court grant such other and further relief to Aeroflex as this Court may deem just and equitable and as the Court deems appropriate.

DEMAND FOR JURY TRIAL

Defendant Aeroflex hereby demands trial by jury in this action.

Respectfully submitted,

CONNOLLY BOVE LODGE & HUTZ LLP

Date: April 9, 2003

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Wilmington, DE 19899
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Attorneys for Defendant/Counterplaintiff
AEROFLEX INC.

CERTIFICATE OF SERVICE

I, Francis DiGiovanni, hereby certify that on this 9th day of April, 2003, a true and correct copy of the foregoing was caused to be served on the attorneys of record at the following addresses:

VIA HAND DELIVERY

Robert W. Whetzel, Esq.
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One Rodney Square
Wilmington, DE 19899

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Francis DiGiovanni

::ODMA\MHODMA\CB;257809;1

EXHIBIT 3

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

RICOH COMPANY, LTD. Plaintiff, v. AEROFLEX INCORPORATED, AMI SEMICONDUCTOR, INC., MATROX ELECTRONIC SYSTEMS LTD., MATROX GRAPHICS INC., MATROX INTERNATIONAL CORP., and MATROX TECH, INC., Defendants.	C.A. No. 03-103-GMS DEMAND FOR JURY TRIAL

AMENDED ANSWER AND COUNTERCLAIMS OF DEFENDANT AMI SEMICONDUCTOR, INC. TO COMPLAINT FOR PATENT INFRINGEMENT

Defendant AMI Semiconductor, Inc. ("AMI") for its Amended Answer to the Complaint and for its Counterclaims, hereby responds to the numbered paragraphs of the Complaint filed by Ricoh Company, Ltd. ("Ricoh"), and in doing so denies the allegations of the Complaint except as specifically stated:

PARTIES

1. Upon information and belief, AMI admits that plaintiff Ricoh is a corporation organized under the laws of Japan and maintains its principal place of business at 3-6 1-chome, Nakamagome, Tokyo, Japan.

2. AMI lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 2, and on that basis, denies those allegations.

3. AMI admits that AMI is a corporation organized under the laws of Delaware, maintains its principal place of business at 2300 Buckskin Road, Pocatello, ID, 83201, and has appointed The Corporation Trust Company, Corporation Trust Center, 1209 Orange Street, Wilmington, DE 19801 as its registered agent in Delaware.

4. AMI lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 4, and on that basis, denies those allegations.

5. AMI lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 5, and on that basis, denies those allegations.

6. AMI lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 6, and on that basis, denies those allegations.

7. AMI lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 7, and on that basis, denies those allegations.

JURISDICTION

8. AMI admits that plaintiff's claim purports to arise under the patent laws of the United States, Title 35, and more particularly under 35 U.S.C. §§ 271 et. seq. Except as expressly admitted, AMI denies the allegations of Paragraph 8 of the Complaint.

9. AMI admits that the Court has subject matter jurisdiction over the allegations of patent infringement in the Complaint pursuant to 28 U.S.C. §§ 1338(a) and 1331. Except as expressly admitted, AMI denies the allegations of Paragraph 9 of the Complaint.

10. AMI admits that the Court has personal jurisdiction over AMI. Except as expressly admitted, AMI denies the allegations of Paragraph 10 of the Complaint.

VENUE

11. AMI admits that venue is proper in this judicial district pursuant to 28 U.S.C. § 1391. Except as expressly admitted, AMI denies the allegations of Paragraph 11 of the Complaint.

FACTUAL BACKGROUND

12. AMI admits that United States Patent No. 4,922,432 ("the '432 Patent") entitled "Knowledge Based Method and Apparatus for Designing Integrated Circuits using Functional Specifications," issued on May 1, 1990. AMI admits that the '432 Patent names Hideaki Kobayashi and Masahiro Shindo as inventors. AMI further admits that a copy of the '432 Patent is attached to the Complaint as Exhibit 1. Except as expressly admitted, AMI denies the allegations of Paragraph 12 of the Complaint.

13. AMI lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 13, and on that basis, denies those allegations.

14. AMI lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 14, and on that basis, denies those allegations.

PATENT INFRINGEMENT

COUNT 1

15. AMI repeats its responses to the allegations in Paragraphs 1 through 14 of the Complaint.

16. AMI lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 16, and on that basis, denies those allegations.

17. AMI lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 17, and on that basis, denies those allegations.

18. AMI lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 18, and on that basis, denies those allegations.

19. AMI lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 19, and on that basis, denies those allegations.

20. AMI lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 20, and on that basis, denies those allegations.

COUNT 2

21. AMI repeats its responses to the allegations in Paragraphs 1 through 14 of the Complaint.

22. AMI denies each and every allegation in Paragraph 22 of the Complaint.

23. AMI denies each and every allegation of Paragraph 23 of the Complaint.

24. AMI denies each and every allegation of Paragraph 24 of the Complaint.

25. AMI denies each and every allegation of Paragraph 25 of the Complaint.

26. AMI denies each and every allegation of Paragraph 26 of the Complaint.

COUNT 3

27. AMI repeats its responses to the allegations in Paragraphs 1 through 14 of the Complaint.

28. AMI lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 28, and on that basis, denies those allegations.

29. AMI lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 29, and on that basis, denies those allegations.

30. AMI lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 30, and on that basis, denies those allegations.

31. AMI lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 31, and on that basis, denies those allegations.

32. AMI lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 32, and on that basis, denies those allegations.

COUNT 4

33. AMI repeats its responses to the allegations in Paragraphs 1 through 14 of the Complaint.

34. AMI lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 34, and on that basis, denies those allegations.

35. AMI lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 35, and on that basis, denies those allegations.

36. AMI lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 36, and on that basis, denies those allegations.

37. AMI lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 37, and on that basis, denies those allegations.

38. AMI lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 38, and on that basis, denies those allegations.

COUNT 5

39. AMI repeats its responses to the allegations in Paragraphs 1 through 14 of the Complaint.

40. AMI lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 40, and on that basis, denies those allegations.

41. AMI lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 41, and on that basis, denies those allegations.

42. AMI lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 42, and on that basis, denies those allegations.

43. AMI lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 43, and on that basis, denies those allegations.

44. AMI lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 44, and on that basis, denies those allegations.

COUNT 6

45. AMI repeats its responses to the allegations in Paragraphs 1 through 14 of the Complaint.

46. AMI lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 46, and on that basis, denies those allegations.

47. AMI lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 47, and on that basis, denies those allegations.

48. AMI lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 48, and on that basis, denies those allegations.

49. AMI lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 49, and on that basis, denies those allegations.

50. AMI lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 50, and on that basis, denies those allegations.

DEFENSES

In further response to the Complaint, Defendant AMI asserts the following:

FIRST AFFIRMATIVE DEFENSE: INVALIDITY

51. The '432 Patent is invalid for failure to meet the requirements specified in Title 35 of the United States Code, including, but not limited to, 35 U.S.C. §§ 101, 102, 103, and 112 for one or more of the following reasons: (a) the inventor named in the '432 Patent did not invent or discover any new useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof within the meaning of 35 U.S.C. § 101; (b) the subject matter claimed in the '432 Patent was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before it was invented by the inventors named in the '432 Patent, as prohibited by 35 U.S.C. § 102(a); (c) the subject matter claimed in the '432 Patent was patented or described in a printed publication in this or a foreign country or was in public use or on sale in this country, more than one year prior to the filing of the application which resulted in the '432 Patent in the United States, as prohibited by 35 U.S.C. § 102(b); (d) the subject matter claimed in the '432 Patent was described in a United States patent based on an application filed in the United States or described in an application published prior to its invention by the inventors named in the '432 Patent, as prohibited by 35 U.S.C. § 102(e); (e) the inventor named in the '432 Patent did not invent the subject matter; (f) the subject matter claimed in the '432 Patent was invented in this country by another inventor, who did not

abandon, suppress or conceal it, before its invention by the inventors named in the '432 Patent, as prohibited by 35 U.S.C. § 102(g); (g) the subject matter claimed in the '432 Patent would have been obvious, in view of the prior art, to a person having ordinary skill in the art at the time the invention was made under 35 U.S.C. § 103; and/or (h) the claims of the '432 Patent are invalid for failing to comply with 35 U.S.C. § 112, in that (i) the specification fails to contain a written description of the subject matter claimed in the '432 Patent and the manner and process of making and using it; (ii) the claims fail to particularly point out and distinctly claim a patentable invention, (iii) the claims are indefinite, (iv) the specification fails to enable one skilled in the art to practice the claimed invention, and/or (v) the specification fails to set forth the best mode contemplated by the named inventors for carrying out the alleged invention. Defendant reserves the right to amend this defense further, as additional information is developed through discovery or otherwise.

SECOND AFFIRMATIVE DEFENSE: NONINFRINGEMENT

52. AMI has not made, used, offered to sell or sold, within the United Sates, or imported into the United States, any products or processes that infringe any valid claim of the '432 Patent, either directly, indirectly, contributorily or otherwise, and has not induced others to infringe the '432 Patent.

THIRD AFFIRMATIVE DEFENSE: LACHES

53. Plaintiff is barred from recovery of damages by reason of laches.

RESERVATION OF AFFIRMATIVE DEFENSES

54. With discovery still ongoing, AMI has yet to complete its investigation. AMI reserves the right to assert any other defenses that discovery may reveal, including unclean hands or inequitable conduct.

COUNTERCLAIMS

Counterplaintiff AMI Semiconductor, Inc. ("AMI"), for its counterclaims against Counterdefendant Ricoh Company, Ltd. ("Ricoh"), alleges as follows:

PARTIES

55. AMI is a corporation organized under the laws of Delaware, having its principal place of business at 2300 Buckskin Road, Pocatello, ID 83201.

56. Upon information and belief, Ricoh is a corporation organized under the laws of Japan, having its principal place of business at 3-6 1-chome, Nakamagome, Tokyo, Japan.

JURISDICTION AND VENUE

57. Counts 1 through 2 of the counterclaims are based upon the Patent Laws of the United States, Title 35 of the United States Code, §1 *et seq.* The Court has jurisdiction over the counterclaims pursuant to 28 U.S.C. §§ 1331, 1338(a), 2201, and 2202.

58. Ricoh has submitted to the personal jurisdiction of this Court.

59. Venue is proper in this district pursuant to 28 U.S.C. § 1391, because suit was filed in this district by Counterdefendant Ricoh. Venue is also proper in the District of Delaware because the causes of action against Counterdefendant arose in this judicial district.

60. There is an actual justiciable case or controversy between AMI and Ricoh, in this district, arising under the Patent Laws, 35 U.S.C. § 1 *et seq.* This case or controversy arises by virtue of Ricoh's filing of this suit which purports to allege that AMI infringes U.S. Patent No. 4,922,432 ("the '432 Patent") and AMI's Answer thereto, which asserts the invalidity and noninfringement of the '432 Patent.

COUNT 1

DECLARATORY JUDGMENT OF INVALIDITY

61. AMI incorporates by reference Paragraphs 55-60 as though fully set forth herein.

62. The '432 Patent, entitled "Knowledge Based Method and Apparatus for Designing Integrated Circuits using Functional Specifications" issued on May 1, 1990. Ricoh purports to be the owner of the '432 Patent.

63. Ricoh has sued AMI in the present action, alleging infringement of the '432 Patent.

64. Based on Paragraph 51 above, which is specifically incorporated by reference into this Paragraph, the '432 Patent is invalid.

65. AMI requests declaratory judgment that the '432 Patent is invalid.

COUNT 2

DECLARATORY JUDGMENT OF NONINFRINGEMENT

66. AMI incorporates by reference Paragraphs 55-60 and 62-63 into this count as though fully set forth herein.

67. Based on Paragraph 52 above, which is specifically incorporated by reference into this Paragraph, the '432 Patent is not infringed by AMI.

68. AMI requests declaratory judgment that AMI has not infringed the '432 Patent.

RESERVATION OF COUNTERCLAIMS

69. AMI reserves the right to assert any other counterclaims that discovery may reveal, including, but not limited to, claims arising out of false or misleading statements to the public and/or customers.

PRAYER FOR RELIEF

WHEREFORE, AMI respectfully prays for the following relief:

A. that this Court deny and all relief requested by Plaintiff in its Complaint and any relief whatsoever, and that the Complaint be dismissed with prejudice;

B. that this Court declare the '432 Patent invalid;

C. that this Court declare the '432 Patent unenforceable;

D. that this Court declare that AMI has not infringed any valid claim of the '432 Patent;

E. that this Court declare the case to be exceptional pursuant to 35 U.S.C. § 285 and that costs of this action and attorneys' fees be awarded to AMI;

F. that this Court grant such other and further relief to AMI as this Court may deem just and equitable and as the Court deems appropriate.

DEMAND FOR JURY TRIAL

Defendant AMI hereby demands trial by jury in this action.

Respectfully submitted,

Dated: April 10, 2003

Francis DiGiovanni (#3189)
CONNOLLY BOVE LODGE & HUTZ LLP
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Attorneys for Defendant/Counterplaintiff
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AMI Semiconductor, Inc.

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CERTIFICATE OF SERVICE

I, Francis DiGiovanni, hereby certify that on this 10th day of April, 2003, a true and correct copy of the foregoing was caused to be served on the attorneys of record at the following addresses:

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Francis DiGiovanni

::ODMA\MHODMA\CB;257809;1

EXHIBIT 4

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

RICOH COMPANY, LTD. Plaintiff, v. AEROFLEX INCORPORATED, AMI SEMICONDUCTOR, INC., MATROX ELECTRONIC SYSTEMS LTD., MATROX GRAPHICS INC., MATROX INTERNATIONAL CORP., and MATROX TECH, INC., Defendants.	C.A. No. 03-103-GMS

AMENDED ANSWER AND COUNTERCLAIMS OF DEFENDANT MATROX TECH, INC. TO COMPLAINT FOR PATENT INFRINGEMENT

Defendant Matrox Tech, Inc. ("Matrox Tech") for its Amended Answer to the Complaint and for its Counterclaims, hereby responds to the numbered paragraphs of the Complaint filed by Ricoh Company, Ltd. ("Ricoh"), and in doing so denies the allegations of the Complaint except as specifically stated:

PARTIES

1. Upon information and belief, Matrox Tech admits that plaintiff Ricoh is a corporation organized under the laws of Japan and maintains its principal place of business at 3-6 1-chome, Nakamagome, Tokyo, Japan.

2. Matrox Tech lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 2, and on that basis, denies those allegations.

3. Matrox Tech lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 3, and on that basis, denies those allegations.

4. Matrox Tech lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 4, and on that basis, denies those allegations

5. Matrox Tech lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 5, and on that basis, denies those allegations.

6. Matrox Tech lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 6, and on that basis, denies those allegations.

7. Matrox Tech admits that it is a corporation organized under the laws of Delaware, maintains its principal place of business at 1075 Broken Sound Parkway, NW, Boca Raton, FL 33487-3524 and has appointed The Corporation Trust Company, Corporation Trust Center, 1209 Orange Street, Wilmington, DE 19801 as its registered agent in Delaware.

JURISDICTION

8. Matrox Tech admits that plaintiff's claim purports to arise under the patent laws of the United States, Title 35, and more particularly under 35 U.S.C. §§ 271 et. seq. Except as expressly admitted, Matrox Tech denies the allegations of Paragraph 8 of the Complaint.

9. Matrox Tech admits that the Court has subject matter jurisdiction over the allegations of patent infringement in the Complaint pursuant to 28 U.S.C. §§ 1338(a) and 1331. Except as expressly admitted, Matrox Tech denies the allegations of Paragraph 9 of the Complaint.

10. Matrox Tech admits that the Court has personal jurisdiction over Matrox Tech. Except as expressly admitted, Matrox Tech lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 10, and on that basis, denies those allegations.

VENUE

11. Matrox Tech admits that venue is proper in this judicial district pursuant to 28 U.S.C. § 1391. Except as expressly admitted, Matrox Tech denies the allegations of Paragraph 11 of the Complaint.

FACTUAL BACKGROUND

12. Matrox Tech dmits that United States Patent No. 4,922,432 ("the '432 Patent") entitled "Knowledge Based Method and Apparatus for Designing Integrated Circuits using Functional Specifications," issued on May 1, 1990. Matrox Tech admits that the '432 Patent names Hideaki Kobayashi and Masahiro Shindo as inventors. Matrox Tech further admits that a copy of the '432 Patent is attached to the Complaint as Exhibit 1. Except as expressly admitted, Matrox Tech denies the allegations of Paragraph 12 of the Complaint.

13. Matrox Tech lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 13, and on that basis, denies those allegations.

14. Matrox Tech lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 14, and on that basis, denies those allegations.

PATENT INFRINGEMENT

COUNT 1

15. Matrox Tech repeats its responses to the allegations in Paragraphs 1 through 14 of the Complaint.

16. Matrox Tech lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 16, and on that basis, denies those allegations.

17. Matrox Tech lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 17, and on that basis, denies those allegations.

18. Matrox Tech lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 18, and on that basis, denies those allegations.

19. Matrox Tech lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 19, and on that basis, denies those allegations.

20. Matrox Tech lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 20, and on that basis, denies those allegations.

COUNT 2

21. Matrox Tech repeats its responses to the allegations in Paragraphs 1 through 14 of the Complaint.

22. Matrox Tech lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 22, and on that basis, denies those allegations.

23. Matrox Tech lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 23, and on that basis, denies those allegations.

24. Matrox Tech lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 24, and on that basis, denies those allegations.

25. Matrox Tech lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 25, and on that basis, denies those allegations.

26. Matrox Tech lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 26, and on that basis, denies those allegations.

COUNT 3

27. Matrox Tech repeats its responses to the allegations in Paragraphs 1 through 14 of the Complaint.

28. Matrox Tech lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 28, and on that basis, denies those allegations.

29. Matrox Tech lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 29, and on that basis, denies those allegations.

30. Matrox Tech lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 30, and on that basis, denies those allegations.

31. Matrox Tech lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 31, and on that basis, denies those allegations.

32. Matrox Tech lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 32, and on that basis, denies those allegations.

COUNT 4

33. Matrox Tech repeats its responses to the allegations in Paragraphs 1 through 14 of the Complaint.

34. Matrox Tech lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 34, and on that basis, denies those allegations.

35. Matrox Tech lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 35, and on that basis, denies those allegations.

36. Matrox Tech lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 36, and on that basis, denies those allegations.

37. Matrox Tech lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 37, and on that basis, denies those allegations.

38. Matrox Tech lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 38, and on that basis, denies those allegations.

COUNT 5

39. Matrox Tech repeats its responses to the allegations in Paragraphs 1 through 14 of the Complaint.

40. Matrox Tech lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 40, and on that basis, denies those allegations.

41. Matrox Tech lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 41, and on that basis, denies those allegations.

42. Matrox Tech lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 42, and on that basis, denies those allegations.

43. Matrox Tech lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 43, and on that basis, denies those allegations.

44. Matrox Tech lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 44, and on that basis, denies those allegations.

COUNT 6

45. Matrox Tech repeats its responses to the allegations in Paragraphs 1 through 14 of the Complaint.

46. Matrox Tech denies each and every allegation in Paragraph 46 of the Complaint.

47. Matrox Tech denies each and every allegation of Paragraph 47 of the Complaint.

48. Matrox Tech denies each and every allegation of Paragraph 48 of the Complaint.

49. Matrox Tech denies each and every allegation of Paragraph 49 of the Complaint.

50. Matrox Tech denies each and every allegation of Paragraph 50 of the Complaint.

DEFENSES

In further response to the Complaint, Defendant Matrox Tech asserts the following:

FIRST AFFIRMATIVE DEFENSE: INVALIDITY

51. The '432 Patent is invalid for failure to meet the requirements specified in Title 35 of the United States Code, including, but not limited to, 35 U.S.C. §§ 101, 102, 103, and 112 for one or more of the following reasons: (a) the inventor named in the '432 Patent did not invent or discover any new useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof within the meaning of 35 U.S.C. § 101; (b) the subject matter claimed in the '432 Patent was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before it was invented by the inventors named in the '432 Patent, as prohibited by 35 U.S.C. § 102(a); (c) the subject matter claimed in the '432 Patent was patented or described in a printed publication in this or a foreign country or was in public use or on sale in this country, more than one year prior to the filing of the application which resulted in the '432 Patent in the United States, as prohibited by 35 U.S.C. §

102(b); (d) the subject matter claimed in the '432 Patent was described in a United States patent based on an application filed in the United States or described in an application published prior to its invention by the inventors named in the '432 Patent, as prohibited by 35 U.S.C. § 102(e); (e) the inventor named in the '432 Patent did not invent the subject matter; (f) the subject matter claimed in the '432 Patent was invented in this country by another inventor, who did not abandon, suppress or conceal it, before its invention by the inventors named in the '432 Patent, as prohibited by 35 U.S.C. § 102(g); (g) the subject matter claimed in the '432 Patent would have been obvious, in view of the prior art, to a person having ordinary skill in the art at the time the invention was made under 35 U.S.C. § 103; and/or (h) the claims of the '432 Patent are invalid for failing to comply with 35 U.S.C. § 112, in that (i) the specification fails to contain a written description of the subject matter claimed in the '432 Patent and the manner and process of making and using it; (ii) the claims fail to particularly point out and distinctly claim a patentable invention, (iii) the claims are indefinite, (iv) the specification fails to enable one skilled in the art to practice the claimed invention, and/or (v) the specification fails to set forth the best mode contemplated by the named inventors for carrying out the alleged invention. Defendant reserves the right to amend this defense further, as additional information is developed through discovery or otherwise.

SECOND AFFIRMATIVE DEFENSE: NONINFRINGEMENT

52. Matrox Tech has not made, used, offered to sell or sold, within the United Sates, or imported into the United States, any products or processes that infringe any valid claim of the '432 Patent, either directly, indirectly, contributorily or otherwise, and has not induced others to infringe the '432 Patent.

THIRD AFFIRMATIVE DEFENSE: LACHES

53. Plaintiff is barred from recovery of damages by reason of laches.

RESERVATION OF AFFIRMATIVE DEFENSES

54. With discovery still ongoing, Matrox Tech has yet to complete its investigation. Matrox Tech reserves the right to assert any other defenses that discovery may reveal, including unclean hands and inequitable conduct.

COUNTERCLAIMS

Counterplaintiff Matrox Tech, Inc. ("Matrox Tech"), for its counterclaims against Counterdefendant Ricoh Company, Ltd. ("Ricoh"), alleges as follows:

PARTIES

55. Matrox Tech is a corporation organized under the laws of Delaware, having its principal place of business at 1075 Broken Sound Parkway, NW, Boca Raton, FL 33487-3524.

56. Upon information and belief, Ricoh is a corporation organized under the laws of Japan, having its principal place of business at 3-6 1-chome, Nakamagome, Tokyo, Japan.

JURISDICTION AND VENUE

57. Counts 1 through 2 of the counterclaims are based upon the Patent Laws of the United States, Title 35 of the United States Code, §1 *et seq*. The Court has jurisdiction over the counterclaims pursuant to 28 U.S.C. §§ 1331, 1338(a), 2201, and 2202.

58. Ricoh has submitted to the personal jurisdiction of this Court.

59. Venue is proper in this district pursuant to 28 U.S.C. § 1391, because suit was filed in this district by Counterdefendant Ricoh. Venue is also proper in the District of Delaware because the causes of action against Counterdefendant arose in this judicial district.

60. There is an actual justiciable case or controversy between Matrox Tech and Ricoh, in this district, arising under the Patent Laws, 35 U.S.C. § 1 *et seq*. This case or controversy arises by virtue of Ricoh's filing of this suit which purports to allege that Matrox Tech infringes U.S. Patent No. 4,922,432 ("the '432 Patent") and Matrox Tech's Answer thereto, which asserts the invalidity and noninfringement of the '432 Patent.

COUNT 1

DECLARATORY JUDGMENT OF INVALIDITY

61. Matrox Tech incorporates by reference Paragraphs 55-60 as though fully set forth herein.

62. The '432 Patent, entitled "Knowledge Based Method and Apparatus for Designing Integrated Circuits using Functional Specifications" issued on May 1, 1990. Ricoh purports to be the owner of the '432 Patent.

63. Ricoh has sued Matrox Tech in the present action, alleging infringement of the '432 Patent.

64. Based on Paragraph 51 above, which is specifically incorporated by reference into this Paragraph, the '432 Patent is invalid.

65. Matrox Tech requests declaratory judgment that the '432 Patent is invalid.

COUNT 2

DECLARATORY JUDGMENT OF NONINFRINGEMENT

66. Matrox Tech incorporates by reference Paragraphs 55-60 and 62-63 into this count as though fully set forth herein.

67. Based on Paragraph 52 above, which is specifically incorporated by reference into this Paragraph, the '432 Patent is not infringed by Matrox Tech.

68. Matrox Tech requests declaratory judgment that Matrox Tech has not infringed the '432 Patent.

RESERVATION OF COUNTERCLAIMS

69. Matrox Tech reserves the right to assert any other counterclaims that discovery may reveal, including, but not limited to, claims arising out of false or misleading statements to the public and/or customers.

PRAYER FOR RELIEF

WHEREFORE, Matrox Tech respectfully prays for the following relief:

A. that this Court deny and all relief requested by Plaintiff in its Complaint and any relief whatsoever, and that the Complaint be dismissed with prejudice;

B. that this Court declare the '432 Patent invalid;

C. that this Court declare the '432 Patent unenforceable;

D. that this Court declare that Matrox Tech has not infringed any valid claim of the '432 Patent;

E. that this Court declare the case to be exceptional pursuant to 35 U.S.C. § 285 and that costs of this action and attorneys' fees be awarded to Matrox Tech;

F. that this Court grant such other and further relief to Matrox Tech as this Court may deem just and equitable and as the Court deems appropriate.

Respectfully submitted,

CONNOLLY BOVE LODGE & HUTZ LLP

Date: April 9, 2003

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Attorneys for Defendant/Counterplaintiff
MATROX TECH INC.

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CERTIFICATE OF SERVICE

I, Francis DiGiovanni, hereby certify that on this 9th day of April, 2003, a true and correct copy of the foregoing was caused to be served on the attorneys of record at the following addresses:

VIA HAND DELIVERY

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EXHIBIT 5

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

RICOH COMPANY, LTD. Plaintiff, v. AEROFLEX INCORPORATED, AMI SEMICONDUCTOR, INC., MATROX ELECTRONIC SYSTEMS LTD., MATROX GRAPHICS INC., MATROX INTERNATIONAL CORP., and MATROX TECH, INC., Defendants.	C.A. No. 03-103-GMS

AMENDED ANSWER AND COUNTERCLAIMS OF DEFENDANT MATROX INTERNATIONAL CORP. TO COMPLAINT FOR PATENT INFRINGEMENT

Defendant Matrox International Corp. ("Matrox Int'l") for its Amended Answer to the Complaint and for its Counterclaims, hereby responds to the numbered paragraphs of the Complaint filed by Ricoh Company, Ltd. ("Ricoh"), and in doing so denies the allegations of the Complaint except as specifically stated:

PARTIES

1. Upon information and belief, Matrox Int'l admits that plaintiff Ricoh is a corporation organized under the laws of Japan and maintains its principal place of business at 3-6 1-chome, Nakamagome, Tokyo, Japan.

2. Matrox Int'l lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 2, and on that basis, denies those allegations.

3. Matrox Int'l lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 3, and on that basis, denies those allegations.

4. Matrox Int'l lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 4, and on that basis, denies those allegations

5. Matrox Int'l lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 5, and on that basis, denies those allegations.

6. Matrox Int'l admits that it is a corporation organized under the laws of New York and maintains its principal place of business at 625 State Rt. 3, Unit B, Plattsburgh, NY 12901. Except as expressly admitted, Matrox Int'l denies the allegations of Paragraph 6 of the Complaint.

7. Matrox Int'l lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 7, and on that basis, denies those allegations.

JURISDICTION

8. Matrox Int'l admits that plaintiff's claim purports to arise under the patent laws of the United States, Title 35, and more particularly under 35 U.S.C. §§ 271 et. seq. Except as expressly admitted, Matrox Int'l denies the allegations of Paragraph 8 of the Complaint.

9. Matrox Int'l admits that the Court has subject matter jurisdiction over the allegations of patent infringement in the Complaint pursuant to 28 U.S.C. §§ 1338(a) and 1331. Except as expressly admitted, Matrox Int'l denies the allegations of Paragraph 9 of the Complaint.

10. Matrox Int'l denies that the Court has personal jurisdiction over Matrox Int'l. Except as expressly denied, Matrox Int'l lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 10, and on that basis, denies those allegations.

VENUE

11. Matrox Int'l admits that venue is proper in this judicial district pursuant to 28 U.S.C. § 1391. Except as expressly admitted, Matrox Int'l denies the allegations of Paragraph 11 of the Complaint.

FACTUAL BACKGROUND

12. Matrox Int'l admits that United States Patent No. 4,922,432 ("the '432 Patent") entitled "Knowledge Based Method and Apparatus for Designing Integrated Circuits using Functional Specifications," issued on May 1, 1990. Matrox Int'l admits that the '432 Patent names Hideaki Kobayashi and Masahiro Shindo as inventors. Matrox Int'l further admits that a

copy of the '432 Patent is attached to the Complaint as Exhibit 1. Except as expressly admitted, Matrox Int'l denies the allegations of Paragraph 12 of the Complaint.

13. Matrox Int'l lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 13, and on that basis, denies those allegations.

14. Matrox Int'l lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 14, and on that basis, denies those allegations.

PATENT INFRINGEMENT

COUNT 1

15. Matrox Int'l repeats its responses to the allegations in Paragraphs 1 through 14 of the Complaint.

16. Matrox Int'l lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 16, and on that basis, denies those allegations.

17. Matrox Int'l lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 17, and on that basis, denies those allegations.

18. Matrox Int'l lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 18, and on that basis, denies those allegations.

19. Matrox Int'l lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 19, and on that basis, denies those allegations.

20. Matrox Int'l lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 20, and on that basis, denies those allegations.

COUNT 2

21. Matrox Int'l repeats its responses to the allegations in Paragraphs 1 through 14 of the Complaint.

22. Matrox Int'l lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 22, and on that basis, denies those allegations.

23. Matrox Int'l lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 23, and on that basis, denies those allegations.

24. Matrox Int'l lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 24, and on that basis, denies those allegations.

25. Matrox Int'l lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 25, and on that basis, denies those allegations.

26. Matrox Int'l lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 26, and on that basis, denies those allegations.

COUNT 3

27. Matrox Int'l repeats its responses to the allegations in Paragraphs 1 through 14 of the Complaint.

28. Matrox Int'l lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 28, and on that basis, denies those allegations.

29. Matrox Int'l lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 29, and on that basis, denies those allegations.

30. Matrox Int'l lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 30, and on that basis, denies those allegations.

31. Matrox Int'l lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 31, and on that basis, denies those allegations.

32. Matrox Int'l lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 32, and on that basis, denies those allegations.

COUNT 4

33. Matrox Int'l repeats its responses to the allegations in Paragraphs 1 through 14 of the Complaint.

34. Matrox Int'l lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 34, and on that basis, denies those allegations.

35. Matrox Int'l lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 35, and on that basis, denies those allegations.

36. Matrox Int'l lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 36, and on that basis, denies those allegations.

37. Matrox Int'l lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 37, and on that basis, denies those allegations.

38. Matrox Int'l lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 38, and on that basis, denies those allegations.

COUNT 5

39. Matrox Int'l repeats its responses to the allegations in Paragraphs 1 through 14 of the Complaint.

40. Matrox Int'l denies each and every allegation in Paragraph 40 of the Complaint.

41. Matrox Int'l denies each and every allegation of Paragraph 41 of the Complaint.

42. Matrox Int'l denies each and every allegation of Paragraph 42 of the Complaint.

43. Matrox Int'l denies each and every allegation of Paragraph 43 of the Complaint.

44. Matrox Int'l denies each and every allegation of Paragraph 44 of the Complaint.

COUNT 6

45. Matrox Int'l repeats its responses to the allegations in Paragraphs 1 through 14 of the Complaint.

46. Matrox Int'l lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 46, and on that basis, denies those allegations.

47. Matrox Int'l lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 47, and on that basis, denies those allegations.

48. Matrox Int'l lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 48, and on that basis, denies those allegations.

49. Matrox Int'l lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 49, and on that basis, denies those allegations.

50. Matrox Int'l lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 50, and on that basis, denies those allegations.

DEFENSES

In further response to the Complaint, Defendant Matrox Int'l asserts the following:

FIRST AFFIRMATIVE DEFENSE: INVALIDITY

51. The '432 Patent is invalid for failure to meet the requirements specified in Title 35 of the United States Code, including, but not limited to, 35 U.S.C. §§ 101, 102, 103, and 112 for one or more of the following reasons: (a) the inventor named in the '432 Patent did not invent or discover any new useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof within the meaning of 35 U.S.C. § 101; (b) the subject matter claimed in the '432 Patent was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before it was invented by the inventors named in the '432 Patent, as prohibited by 35 U.S.C. § 102(a); (c) the subject matter claimed in the '432 Patent was patented or described in a printed publication in this or a foreign country or was in public use or on sale in this country, more than one year prior to the filing of the application which resulted in the '432 Patent in the United States, as prohibited by 35 U.S.C. § 102(b); (d) the subject matter claimed in the '432 Patent was described in a United States patent based on an application filed in the United States or described in an application published prior to its invention by the inventors named in the '432 Patent, as prohibited by 35 U.S.C. § 102(e); (e) the inventor named in the '432 Patent did not invent the subject matter; (f) the subject matter claimed in the '432 Patent was invented in this country by another inventor, who did not abandon, suppress or conceal it, before its invention by the inventors named in the '432 Patent, as prohibited by 35 U.S.C. § 102(g); (g) the subject matter claimed in the '432 Patent would have been obvious, in view of the prior art, to a person having ordinary skill in the art at the time the invention was made under 35 U.S.C. § 103; and/or (h) the claims of the '432 Patent are invalid for failing to comply with 35 U.S.C. § 112, in that (i) the specification fails to contain a written description of the subject matter claimed in the '432 Patent and the manner and process of making and using it; (ii) the claims fail to particularly point out and distinctly claim a patentable invention, (iii) the claims are indefinite, (iv) the specification fails to enable one skilled in the art

to practice the claimed invention, and/or (v) the specification fails to set forth the best mode contemplated by the named inventors for carrying out the alleged invention. Defendant reserves the right to amend this defense further, as additional information is developed through discovery or otherwise.

SECOND AFFIRMATIVE DEFENSE: NONINFRINGEMENT

52. Matrox Int'l has not made, used, offered to sell or sold, within the United Sates, or imported into the United States, any products or processes that infringe any valid claim of the '432 Patent, either directly, indirectly, contributorily or otherwise, and has not induced others to infringe the '432 Patent.

THIRD AFFIRMATIVE DEFENSE: LACHES

53. Plaintiff is barred from recovery of damages by reason of laches.

RESERVATION OF AFFIRMATIVE DEFENSES

54. With discovery still ongoing, Matrox Int'l has yet to complete its investigation. Matrox Int'l reserves the right to assert any other defenses that discovery may reveal, including unclean hands and inequitable conduct.

COUNTERCLAIMS

Counterplaintiff Matrox International Corp. ("Matrox Int'l"), for its counterclaims against Counterdefendant Ricoh Company, Ltd. ("Ricoh"), alleges as follows:

PARTIES

55. Matrox Int'l is a corporation organized under the laws of New York, having its principal place of business at 625 State Rt 3, Unit B, Plattsburgh, NY 12901.

56. Upon information and belief, Ricoh is a corporation organized under the laws of Japan, having its principal place of business at 3-6 1-chome, Nakamagome, Tokyo, Japan.

JURISDICTION AND VENUE

57. Counts 1 through 2 of the counterclaims are based upon the Patent Laws of the United States, Title 35 of the United States Code, §1 *et seq*. The Court has jurisdiction over the counterclaims pursuant to 28 U.S.C. §§ 1331, 1338(a), 2201, and 2202.

58. Ricoh has submitted to the personal jurisdiction of this Court.

59. Venue is proper in this district pursuant to 28 U.S.C. § 1391, because suit was filed in this district by Counterdefendant Ricoh. Venue is also proper in the District of Delaware because the causes of action against Counterdefendant arose in this judicial district.

60. There is an actual justiciable case or controversy between Matrox Int'l and Ricoh, in this district, arising under the Patent Laws, 35 U.S.C. § 1 *et seq*. This case or controversy arises by virtue of Ricoh's filing of this suit which purports to allege that Matrox Int'l infringes U.S. Patent No. 4,922,432 ("the '432 Patent") and Matrox Int'l's Answer thereto, which asserts the invalidity and noninfringement of the '432 Patent.

COUNT 1

DECLARATORY JUDGMENT OF INVALIDITY

61. Matrox Int'l incorporates by reference Paragraphs 55-60 as though fully set forth herein.

62. The '432 Patent, entitled "Knowledge Based Method and Apparatus for Designing Integrated Circuits using Functional Specifications" issued on May 1, 1990. Ricoh purports to be the owner of the '432 Patent.

63. Ricoh has sued Matrox Int'l in the present action, alleging infringement of the '432 Patent.

64. Based on Paragraph 51 above, which is specifically incorporated by reference into this Paragraph, the '432 Patent is invalid.

65. Matrox Int'l requests declaratory judgment that the '432 Patent is invalid.

COUNT 2

DECLARATORY JUDGMENT OF NONINFRINGEMENT

66. Matrox Int'l incorporates by reference Paragraphs 55-60 and 62-63 into this count as though fully set forth herein.

67. Based on Paragraph 52 above, which is specifically incorporated by reference into this Paragraph, the '432 Patent is not infringed by Matrox Int'l.

68. Matrox Int'l requests declaratory judgment that Matrox Int'l has not infringed the '432 Patent.

RESERVATION OF COUNTERCLAIMS

69. Matrox Int'l reserves the right to assert any other counterclaims that discovery may reveal, including, but not limited to, claims arising out of false or misleading statements to the public and/or customers.

PRAYER FOR RELIEF

WHEREFORE, Matrox Int'l respectfully prays for the following relief:

A. that this Court deny and all relief requested by Plaintiff in its Complaint and any relief whatsoever, and that the Complaint be dismissed with prejudice;

B. that this Court declare the '432 Patent invalid;

C. that this Court declare the '432 Patent unenforceable;

D. that this Court declare that Matrox Int'l has not infringed any valid claim of the '432 Patent;

E. that this Court declare the case to be exceptional pursuant to 35 U.S.C. § 285 and that costs of this action and attorneys' fees be awarded to Matrox Int'l;

F. that this Court grant such other and further relief to Matrox Int'l as this Court may deem just and equitable and as the Court deems appropriate.

Respectfully submitted,

CONNOLLY BOVE LODGE & HUTZ LLP

Date: April 9, 2003

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Attorneys for Defendant/Counterplaintiff
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257849_1.DOC

CERTIFICATE OF SERVICE

I, Francis DiGiovanni, hereby certify that on this 9th day of April, 2003, a true and correct copy of the foregoing was caused to be served on the attorneys of record at the following addresses:

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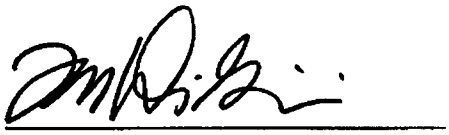

Francis DiGiovanni

::ODMA\MHODMA\CB;257809;1

EXHIBIT 6

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

RICOH COMPANY, LTD. Plaintiff, v. AEROFLEX INCORPORATED, AMI SEMICONDUCTOR, INC., MATROX ELECTRONIC SYSTEMS LTD., MATROX GRAPHICS INC., MATROX INTERNATIONAL CORP., and MATROX TECH, INC., Defendants.	C.A. No. 03-103-GMS

AMENDED ANSWER AND COUNTERCLAIMS OF DEFENDANT MATROX ELECTRONIC SYSTEMS LTD. TO COMPLAINT FOR PATENT INFRINGEMENT

Defendant Matrox Electronic Systems Ltd. ("Matrox") for its Amended Answer to the Complaint and for its Counterclaims, hereby responds to the numbered paragraphs of the Complaint filed by Ricoh Company, Ltd. ("Ricoh"), and in doing so denies the allegations of the Complaint except as specifically stated:

PARTIES

1. Upon information and belief, Matrox admits that plaintiff Ricoh is a corporation organized under the laws of Japan and maintains its principal place of business at 3-6 1-chome, Nakamagome, Tokyo, Japan.

2. Matrox lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 2, and on that basis, denies those allegations.

3. Matrox lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 3, and on that basis, denies those allegations.

4. Matrox admits that its principal place of business is at 1055 Boul St-Regis, Dorval, Quebec H9P 2T4 Canada. Except as expressly admitted, Matrox denies the allegations of Paragraph 4 of the Complaint.

5. Matrox lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 5, and on that basis, denies those allegations.

6. Matrox lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 6, and on that basis, denies those allegations.

7. Matrox lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 7, and on that basis, denies those allegations.

JURISDICTION

8. Matrox admits that plaintiff's claim purports to arise under the patent laws of the United States, Title 35, and more particularly under 35 U.S.C. §§ 271 et. seq. Except as expressly admitted, Matrox denies the allegations of Paragraph 8 of the Complaint.

9. Matrox admits that the Court has subject matter jurisdiction over the allegations of patent infringement in the Complaint pursuant to 28 U.S.C. §§ 1338(a) and 1331. Except as expressly admitted, Matrox denies the allegations of Paragraph 9 of the Complaint.

10. Matrox denies that the Court has personal jurisdiction over Matrox. Except as expressly denied, Matrox lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 10, and on that basis, denies those allegations.

VENUE

11. Matrox admits that venue is proper in this judicial district pursuant to 28 U.S.C. § 1391. Except as expressly admitted, Matrox denies the allegations of Paragraph 11 of the Complaint.

FACTUAL BACKGROUND

12. Matrox admits that United States Patent No. 4,922,432 ("the '432 Patent") entitled "Knowledge Based Method and Apparatus for Designing Integrated Circuits

using Functional Specifications," issued on May 1, 1990. Matrox admits that the '432 Patent names Hideaki Kobayashi and Masahiro Shindo as inventors. Matrox further admits that a copy of the '432 Patent is attached to the Complaint as Exhibit 1. Except as expressly admitted, Matrox denies the allegations of Paragraph 12 of the Complaint.

13. Matrox lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 13, and on that basis, denies those allegations.

14. Matrox lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 14, and on that basis, denies those allegations.

PATENT INFRINGEMENT

COUNT 1

15. Matrox repeats its responses to the allegations in Paragraphs 1 through 14 of the Complaint.

16. Matrox lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 16, and on that basis, denies those allegations.

17. Matrox lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 17, and on that basis, denies those allegations.

18. Matrox lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 18, and on that basis, denies those allegations.

19. Matrox lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 19, and on that basis, denies those allegations.

20. Matrox lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 20, and on that basis, denies those allegations.

COUNT 2

21. Matrox repeats its responses to the allegations in Paragraphs 1 through 14 of the Complaint.

22. Matrox lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 22, and on that basis, denies those allegations.

23. Matrox lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 23, and on that basis, denies those allegations.

24. Matrox lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 24, and on that basis, denies those allegations.

25. Matrox lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 25, and on that basis, denies those allegations.

26. Matrox lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 26, and on that basis, denies those allegations.

COUNT 3

27. Matrox repeats its responses to the allegations in Paragraphs 1 through 14 of the Complaint.

28. Matrox denies each and every allegation in Paragraph 28 of the Complaint.

29. Matrox denies each and every allegation of Paragraph 29 of the Complaint.

30. Matrox denies each and every allegation of Paragraph 30 of the Complaint.

31. Matrox denies each and every allegation of Paragraph 31 of the Complaint.

32. Matrox denies each and every allegation of Paragraph 32 of the Complaint.

COUNT 4

33. Matrox repeats its responses to the allegations in Paragraphs 1 through 14 of the Complaint.

34. Matrox lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 34, and on that basis, denies those allegations.

35. Matrox lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 35, and on that basis, denies those allegations.

36. Matrox lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 36, and on that basis, denies those allegations.

37. Matrox lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 37, and on that basis, denies those allegations.

38. Matrox lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 38, and on that basis, denies those allegations.

COUNT 5

39. Matrox repeats its responses to the allegations in Paragraphs 1 through 14 of the Complaint.

40. Matrox lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 40, and on that basis, denies those allegations.

41. Matrox lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 41, and on that basis, denies those allegations.

42. Matrox lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 42, and on that basis, denies those allegations.

43. Matrox lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 43, and on that basis, denies those allegations.

44. Matrox lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 44, and on that basis, denies those allegations.

COUNT 6

45. Matrox repeats its responses to the allegations in Paragraphs 1 through 14 of the Complaint.

46. Matrox lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 46, and on that basis, denies those allegations.

47. Matrox lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 47, and on that basis, denies those allegations.

48. Matrox lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 48, and on that basis, denies those allegations.

49. Matrox lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 49, and on that basis, denies those allegations.

50. Matrox lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 50, and on that basis, denies those allegations.

DEFENSES

In further response to the Complaint, Defendant Matrox asserts the following:

FIRST AFFIRMATIVE DEFENSE: INVALIDITY

51. The '432 Patent is invalid for failure to meet the requirements specified in Title 35 of the United States Code, including, but not limited to, 35 U.S.C. §§ 101, 102, 103, and 112 for at least the following reasons: (a) the inventor named in the '432 Patent did not invent or discover any new useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof within the meaning of 35 U.S.C. § 101; (b) the subject matter claimed in the '432 Patent was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before it was invented by the inventors named in the '432 Patent, as prohibited by 35 U.S.C. § 102(a); (c) the subject matter claimed in the '432 Patent was patented or described in a printed publication in this or a foreign country or was in public use or on sale in this country, more than one year prior to the filing of the application which resulted in the '432 Patent in the United States, as prohibited by 35 U.S.C. § 102(b); (d) the subject matter claimed in the '432 Patent was described in a United States patent based on an application filed in the United States or described in an application published prior to its invention by the inventors named in the '432 Patent, as prohibited by 35 U.S.C. § 102(e); (e) the inventor named in the '432 Patent did not invent the subject matter; (f) the subject matter claimed in the '432 Patent was invented in this country by another inventor, who did not abandon, suppress or conceal it, before its invention by the inventors named in the '432 Patent, as prohibited by 35 U.S.C. § 102(g); (g) the subject matter claimed in the '432 Patent would have been obvious, in view of the prior art, to a person having ordinary skill in the art at the time the invention was made under 35 U.S.C. § 103; and/or (h) the claims of the '432 Patent are invalid for failing to comply with 35

U.S.C. § 112, in that (i) the specification fails to contain a written description of the subject matter claimed in the '432 Patent and the manner and process of making and using it; (ii) the claims fail to particularly point out and distinctly claim a patentable invention, (iii) the claims are indefinite, (iv) the specification fails to enable one skilled in the art to practice the claimed invention, and/or (v) the specification fails to set forth the best mode contemplated by the named inventors for carrying out the alleged invention. Defendant reserves the right to amend this defense further, as additional information is developed through discovery or otherwise.

SECOND AFFIRMATIVE DEFENSE: NONINFRINGEMENT

52. Matrox has not made, used, offered to sell or sold, within the United Sates, or imported into the United States, any products or processes that infringe any valid claim of the '432 Patent, either directly, indirectly, contributorily or otherwise, and has not induced others to infringe the '432 Patent.

THIRD AFFIRMATIVE DEFENSE: LACHES

53. Plaintiff is barred from recovery of damages by reason of laches.

RESERVATION OF AFFIRMATIVE DEFENSES

54. With discovery still ongoing, Matrox has yet to complete its investigation. Matrox reserves the right to assert any other defenses that discovery may reveal, including unclean hands and inequitable conduct.

COUNTERCLAIMS

Counterplaintiff Matrox Electronic Systems Ltd. ("Matrox"), for its counterclaims against Counterdefendant Ricoh Company, Ltd. ("Ricoh"), alleges as follows:

PARTIES

55. Matrox is a corporation organized under the laws of Canada, having its principal place of business at 1055 Boul St-Regis, Dorval, Quebec H9P 2T4 Canada.

56. Upon information and belief, Ricoh is a corporation organized under the laws of Japan, having its principal place of business at 3-6 1-chome, Nakamagome, Tokyo, Japan.

JURISDICTION AND VENUE

57. Counts 1 through 2 of the counterclaims are based upon the Patent Laws of the United States, Title 35 of the United States Code, §1 *et seq.* The Court has jurisdiction over the counterclaims pursuant to 28 U.S.C. §§ 1331, 1338(a), 2201, and 2202.

58. Ricoh has submitted to the personal jurisdiction of this Court.

59. Venue is proper in this district pursuant to 28 U.S.C. § 1391, because suit was filed in this district by Counterdefendant Ricoh. Venue is also proper in the District of Delaware because the causes of action against Counterdefendant arose in this judicial district.

60. There is an actual justiciable case or controversy between Matrox and Ricoh, in this district, arising under the Patent Laws, 35 U.S.C. § 1 *et seq.* This case or controversy arises by virtue of Ricoh's filing of this suit which purports to allege that Matrox infringes U.S. Patent No. 4,922,432 ("the '432 Patent") and Matrox' Answer thereto, which asserts the invalidity and noninfringement of the '432 Patent.

COUNT 1

DECLARATORY JUDGMENT OF INVALIDITY

61. Matrox incorporates by reference Paragraphs 55-60 as though fully set forth herein.

62. The '432 Patent, entitled "Knowledge Based Method and Apparatus for Designing Integrated Circuits using Functional Specifications" issued on May 1, 1990. Ricoh purports to be the owner of the '432 Patent.

63. Ricoh has sued Matrox in the present action, alleging infringement of the '432 Patent.

64. Based on Paragraph 51 above, which is specifically incorporated by reference into this Paragraph, the '432 Patent is invalid.

65. Matrox requests declaratory judgment that the '432 Patent is invalid.

COUNT 2

DECLARATORY JUDGMENT OF NONINFRINGEMENT

66. Matrox incorporates by reference Paragraphs 55-60 and 62-63 into this count as though fully set forth herein.

67. Based on Paragraph 52 above, which is specifically incorporated by reference into this Paragraph, the '432 Patent is not infringed by Matrox.

68. Matrox requests declaratory judgment that Matrox has not infringed the '432 Patent.

RESERVATION OF COUNTERCLAIMS

69. Matrox reserves the right to assert any other counterclaims that discovery may reveal, including, but not limited to, claims arising out of false or misleading statements to the public and/or customers.

PRAYER FOR RELIEF

WHEREFORE, Matrox respectfully prays for the following relief:

A. that this Court deny and all relief requested by Plaintiff in its Complaint and any relief whatsoever, and that the Complaint be dismissed with prejudice;

B. that this Court declare the '432 Patent invalid;

C. that this Court declare the '432 Patent unenforceable;

D. that this Court declare that Matrox has not infringed any valid claim of the '432 Patent;

E. that this Court declare the case to be exceptional pursuant to § 285 and that costs of this action and attorneys' fees be awarded to Matrox;

F. that this Court grant such other and further relief to Matrox as this Court may deem just and equitable and as the Court deems appropriate.

Respectfully submitted,

CONNOLLY BOVE LODGE & HUTZ LLP

Date: April 9, 2003

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Attorneys for Defendant/Counterplaintiff
MATROX ELECTRONIC SYSTEMS LTD.

257845_1.DOC

CERTIFICATE OF SERVICE

I, Francis DiGiovanni, hereby certify that on this 9th day of April, 2003, a true and correct copy of the foregoing was caused to be served on the attorneys of record at the following addresses:

VIA HAND DELIVERY

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Francis DiGiovanni

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EXHIBIT 7

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

RICOH COMPANY, LTD. Plaintiff, v. AEROFLEX INCORPORATED, AMI SEMICONDUCTOR, INC., MATROX ELECTRONIC SYSTEMS LTD., MATROX GRAPHICS INC., MATROX INTERNATIONAL CORP., and MATROX TECH, INC., Defendants.	C.A. No. 03-103-GMS

AMENDED ANSWER AND COUNTERCLAIMS OF DEFENDANT MATROX GRAPHICS INC. TO COMPLAINT FOR PATENT INFRINGEMENT

Defendant Matrox Graphics Inc. ("Matrox Graphics") for its Amended Answer to the Complaint and for its Counterclaims, hereby responds to the numbered paragraphs of the Complaint filed by Ricoh Company, Ltd. ("Ricoh"), and in doing so denies the allegations of the Complaint except as specifically stated:

PARTIES

1. Upon information and belief, Matrox Graphics admits that plaintiff Ricoh is a corporation organized under the laws of Japan and maintains its principal place of business at 3-6 1-chome, Nakamagome, Tokyo, Japan.

2. Matrox Graphics lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 2, and on that basis, denies those allegations.

3. Matrox Graphics lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 3, and on that basis, denies those allegations.

4. Matrox Graphics lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 4, and on that basis, denies those allegations.

5. Matrox Graphics admits that its principal place of business is at 1055 Boul St-Regis, Dorval, Quebec H9P 2T4 Canada. Except as expressly admitted, Matrox denies the allegations of Paragraph 5 of the Complaint.

6. Matrox Graphics lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 6, and on that basis, denies those allegations.

7. Matrox Graphics lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 7, and on that basis, denies those allegations.

JURISDICTION

8. Matrox Graphics admits that plaintiff's claim purports to arise under the patent laws of the United States, Title 35, and more particularly under 35 U.S.C. §§ 271 et. seq. Except as expressly admitted, Matrox Graphics denies the allegations of Paragraph 8 of the Complaint.

9. Matrox Graphics admits that the Court has subject matter jurisdiction over the allegations of patent infringement in the Complaint pursuant to 28 U.S.C. §§ 1338(a) and 1331. Except as expressly admitted, Matrox Graphics denies the allegations of Paragraph 9 of the Complaint.

10. Matrox Graphics denies that the Court has personal jurisdiction over Matrox Graphics. Except as expressly denied, Matrox Graphics lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 10, and on that basis, denies those allegations.

VENUE

11. Matrox Graphics admits that venue is proper in this judicial district pursuant to 28 U.S.C. § 1391. Except as expressly admitted, Matrox Graphics denies the allegations of Paragraph 11 of the Complaint.

FACTUAL BACKGROUND

12. Matrox Graphics admits that United States Patent No. 4,922,432 ("the '432 Patent") entitled "Knowledge Based Method and Apparatus for Designing Integrated Circuits using Functional Specifications," issued on May 1, 1990. Matrox Graphics admits that the '432 Patent

names Hideaki Kobayashi and Masahiro Shindo as inventors. Matrox Graphics further admits that a copy of the '432 Patent is attached to the Complaint as Exhibit 1. Except as expressly admitted, Matrox Graphics denies the allegations of Paragraph 12 of the Complaint.

13. Matrox Graphics lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 13, and on that basis, denies those allegations.

14. Matrox Graphics lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 14, and on that basis, denies those allegations.

PATENT INFRINGEMENT

COUNT 1

15. Matrox Graphics repeats its responses to the allegations in Paragraphs 1 through 14 of the Complaint.

16. Matrox Graphics lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 16, and on that basis, denies those allegations.

17. Matrox Graphics lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 17, and on that basis, denies those allegations.

18. Matrox Graphics lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 18, and on that basis, denies those allegations.

19. Matrox Graphics lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 19, and on that basis, denies those allegations.

20. Matrox Graphics lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 20, and on that basis, denies those allegations.

COUNT 2

21. Matrox Graphics repeats its responses to the allegations in Paragraphs 1 through 14 of the Complaint.

22. Matrox Graphics lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 22, and on that basis, denies those allegations.

23. Matrox Graphics lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 23, and on that basis, denies those allegations.

24. Matrox Graphics lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 24, and on that basis, denies those allegations.

25. Matrox Graphics lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 25, and on that basis, denies those allegations.

26. Matrox Graphics lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 26, and on that basis, denies those allegations.

COUNT 3

27. Matrox Graphics repeats its responses to the allegations in Paragraphs 1 through 14 of the Complaint.

28. Matrox Graphics lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 28, and on that basis, denies those allegations.

29. Matrox Graphics lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 29, and on that basis, denies those allegations.

30. Matrox Graphics lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 30, and on that basis, denies those allegations.

31. Matrox Graphics lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 31, and on that basis, denies those allegations.

32. Matrox Graphics lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 32, and on that basis, denies those allegations.

COUNT 4

33. Matrox repeats its responses to the allegations in Paragraphs 1 through 14 of the Complaint.

34. Matrox Graphics denies each and every allegation in Paragraph 34 of the Complaint.

35. Matrox Graphics denies each and every allegation of Paragraph 35 of the Complaint.

36. Matrox Graphics denies each and every allegation of Paragraph 36 of the Complaint.

37. Matrox Graphics denies each and every allegation of Paragraph 37 of the Complaint.

38. Matrox Graphics denies each and every allegation of Paragraph 38 of the Complaint.

COUNT 5

39. Matrox Graphics repeats its responses to the allegations in Paragraphs 1 through 14 of the Complaint.

40. Matrox Graphics lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 40, and on that basis, denies those allegations.

41. Matrox Graphics lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 41, and on that basis, denies those allegations.

42. Matrox Graphics lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 42, and on that basis, denies those allegations.

43. Matrox Graphics lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 43, and on that basis, denies those allegations.

44. Matrox Graphics lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 44, and on that basis, denies those allegations.

COUNT 6

45. Matrox Graphics repeats its responses to the allegations in Paragraphs 1 through 14 of the Complaint.

46. Matrox Graphics lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 46, and on that basis, denies those allegations.

47. Matrox Graphics lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 47, and on that basis, denies those allegations.

48. Matrox Graphics lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 48, and on that basis, denies those allegations.

[illegible] allegations of Paragraph 49, and on that basis, denies those allegations.

50. Matrox Graphics lacks information sufficient to form a belief as to the truth of the allegations of Paragraph 50, and on that basis, denies those allegations.

DEFENSES

In further response to the Complaint, Defendant Matrox Graphics asserts the following:

FIRST AFFIRMATIVE DEFENSE: INVALIDITY

51. The '432 Patent is invalid for failure to meet the requirements specified in Title 35 of the United States Code, including, but not limited to, 35 U.S.C. §§ 101, 102, 103, and 112 for at least the following reasons: (a) the inventor named in the '432 Patent did not invent or discover any new useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof within the meaning of 35 U.S.C. § 101; (b) the subject matter claimed in the '432 Patent was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before it was invented by the inventors named in the '432 Patent, as prohibited by 35 U.S.C. § 102(a); (c) the subject matter claimed in the '432 Patent was patented or described in a printed publication in this or a foreign country or was in public use or on sale in this country, more than one year prior to the filing of the application which resulted in the '432 Patent in the United States, as prohibited by 35 U.S.C. § 102(b); (d) the subject matter claimed in the '432 Patent was described in a United States patent based on an application filed in the United States or described in an application published prior to its invention by the inventors named in the '432 Patent, as prohibited by 35 U.S.C. § 102(e); (e) the inventor named in the '432 Patent did not invent the subject matter; (f) the subject matter claimed in the '432 Patent was invented in this country by another inventor, who did not abandon, suppress or conceal it, before its invention by the inventors named in the '432 Patent, as prohibited by 35 U.S.C. § 102(g); (g) the subject matter claimed in the '432 Patent would have been obvious, in view of the prior art, to a person having ordinary skill in the art at the time the invention was

[illegible] invalid for failing to comply with 35 U.S.C. § 112, in that (i) the specification fails to contain a written description of the subject matter claimed in the '432 Patent and the manner and process of making and using it;

(ii) the claims fail to particularly point out and distinctly claim a patentable invention, (iii) the claims are indefinite, (iv) the specification fails to enable one skilled in the art to practice the claimed invention, and/or (v) the specification fails to set forth the best mode contemplated by the named inventors for carrying out the alleged invention. Defendant reserves the right to amend this defense further, as additional information is developed through discovery or otherwise.

SECOND AFFIRMATIVE DEFENSE: NONINFRINGEMENT

52. Matrox Graphics has not made, used, offered to sell or sold, within the United Sates, or imported into the United States, any products or processes that infringe any valid claim of the '432 Patent, either directly, indirectly, contributorily or otherwise, and has not induced others to infringe the '432 Patent.

THIRD AFFIRMATIVE DEFENSE: LACHES

53. Plaintiff is barred from recovery of damages by reason of laches.

RESERVATION OF AFFIRMATIVE DEFENSES

54. With discovery still ongoing, Matrox Graphics has yet to complete its investigation. Matrox Graphics reserves the right to assert any other defenses that discovery may reveal, including unclean hands and inequitable conduct.

COUNTERCLAIMS

Counterplaintiff Matrox Graphics Inc. ("Matrox Graphics"), for its counterclaims against Counterdefendant Ricoh Company, Ltd. ("Ricoh"), alleges as follows:

PARTIES

55. Matrox Graphics is a corporation organized under the laws of Canada, having its principal place of business at 1055 Boul St-Regis, Dorval, Quebec H9P 2T4 Canada.

56. Upon information and belief, Ricoh is a corporation organized under the laws of

JURISDICTION AND VENUE

57. Counts 1 through 2 of the counterclaims are based upon the Patent Laws of the United States, Title 35 of the United States Code, §1 *et seq.* The Court has jurisdiction over the counterclaims pursuant to 28 U.S.C. §§ 1331, 1338(a), 2201, and 2202.

58. Ricoh has submitted to the personal jurisdiction of this Court.

59. Venue is proper in this district pursuant to 28 U.S.C. § 1391, because suit was filed in this district by Counterdefendant Ricoh. Venue is also proper in the District of Delaware because the causes of action against Counterdefendant arose in this judicial district.

60. There is an actual justiciable case or controversy between Matrox Graphics and Ricoh, in this district, arising under the Patent Laws, 35 U.S.C. § 1 *et seq.* This case or controversy arises by virtue of Ricoh's filing of this suit which purports to allege that Matrox Graphics infringes U.S. Patent No. 4,922,432 ("the '432 Patent") and Matrox Graphics' Answer thereto, which asserts the invalidity and noninfringement of the '432 Patent.

COUNT 1

DECLARATORY JUDGMENT OF INVALIDITY

61. Matrox Graphics incorporates by reference Paragraphs 55-60 as though fully set forth herein.

62. The '432 Patent, entitled "Knowledge Based Method and Apparatus for Designing Integrated Circuits using Functional Specifications" issued on May 1, 1990. Ricoh purports to be the owner of the '432 Patent.

63. Ricoh has sued Matrox Graphics in the present action, alleging infringement of the '432 Patent.

64. Based on Paragraph 51 above, which is specifically incorporated by reference into this Paragraph, the '432 Patent is invalid.

[illegible]

COUNT 2

DECLARATORY JUDGMENT OF NONINFRINGEMENT

66. Matrox Graphics incorporates by reference Paragraphs 55-60 and 62-63 into this count as though fully set forth herein.

67. Based on Paragraph 52 above, which is specifically incorporated by reference into this Paragraph, the '432 Patent is not infringed by Matrox Graphics.

68. Matrox requests declaratory judgment that Matrox has not infringed the '432 Patent.

RESERVATION OF COUNTERCLAIMS

69. Matrox Graphics reserves the right to assert any other counterclaims that discovery may reveal, including, but not limited to, claims arising out of false or misleading statements to the public and/or customers.

PRAYER FOR RELIEF

WHEREFORE, Matrox Graphics respectfully prays for the following relief:

A. that this Court deny and all relief requested by Plaintiff in its Complaint and any relief whatsoever, and that the Complaint be dismissed with prejudice;

B. that this Court declare the '432 Patent invalid;

C. that this Court declare the '432 Patent unenforceable;

D. that this Court declare that Matrox Graphics has not infringed any valid claim of the '432 Patent;

E. that this Court declare the case to be exceptional pursuant to § 285 and that costs of this action and attorneys' fees be awarded to Matrox Graphics;

F. that this Court grant such other and further relief to Matrox Graphics as this Court may deem just and equitable and as the Court deems appropriate.

Respectfully submitted,

CONNOLLY BOVE LODGE & HUTZ LLP

Date: April 9, 2003

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Telephone: (302) 658-9141
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Attorneys for Defendant/Counterplaintiff
MATROX GRAPHICS INC.

OF COUNSEL:

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Jayna R. Whitt
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Menlo Park, CA 94025
Telephone: (650) 463-8100

Attorneys for Defendant/Counterplaintiff
MATROX GRAPHICS INC.

257847_1.DOC

CERTIFICATE OF SERVICE

I, Francis DiGiovanni, hereby certify that on this 9th day of April, 2003, a true and correct copy of the foregoing was caused to be served on the attorneys of record at the following addresses:

VIA HAND DELIVERY

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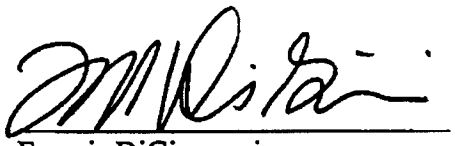

Francis DiGiovanni

::ODMA\MHODMA\CB;257809;1

EXHIBIT 8

56

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT Of DELAWARE

RICOH COMPANY, LTD.

Plaintiff,

v.

AEROFLEX INCORPORATED, AMI SEMICONDUCTOR, INC., MATROX ELECTRONIC SYSTEMS LTD., MATROX GRAPHICS INC., MATROX INTERNATIONAL CORP. and MATROX TECH, INC.

Defendants.

C.A. No.03-103-GMS

SCHEDULING ORDER

This 30th day of May 2003, the Court having conducted an initial Rule 16 scheduling and planning conference pursuant to Local Rule 16.2(b) on May 16, 2003, and the parties having determined after discussion that the matter cannot be resolved at this juncture by settlement, voluntary mediation or binding arbitration;

IT IS ORDERED that:

1. **Rule 26(a) Initial Disclosures.** Unless otherwise agreed to by the parties, they shall make their initial disclosures pursuant to Federal Rule of Civil Procedure 26(a) on or before May 30, 2003.

2. **Joinder of other Parties and Amendment of Pleadings.** All motions to join other parties and amend the pleadings shall be filed on or before July 30, 2003.

3. **Reliance Upon Advice of Counsel.** Defendants shall inform plaintiff whether they intend to rely upon advice of counsel as a defense to willful infringement no later than

December 9, 2003. If defendants elect to rely on advice of counsel as a defense to willful infringement, defendants shall produce any such opinions on which defendants intend to rely to plaintiff no later than December 19, 2003.

4. ***Markman* Claim Construction Hearing.** A *Markman* claim construction hearing shall be held on March 2, 2004 at 9:30 a.m. The *Markman* hearing is scheduled for a total of not more than 1 day. The parties shall meet and confer regarding narrowing and reducing the number of claim construction issues no later than January 5, 2004 and shall exchange initial claim charts no later than January 12, 2004. On or before January 20, 2004, the parties shall submit a final joint claim chart which shall include citations to intrinsic evidence. The parties shall exchange opening claim construction briefs on January 23, 2004, and the answering claim construction briefs on February 6, 2004.

5. **Discovery.** All fact discovery in this case shall be initiated so that it will be completed on or before January 9, 2004. Opening expert reports shall be exchanged on March 22, 2004 and rebuttal expert reports shall be exchanged on April 23, 2004. Expert Discovery in this case shall be initiated so that it will be completed on or before June 23, 2004. The total time allowed for depositions shall be 240 hours per side, excluding expert discovery, unless extended by agreement of the parties.

a. **Discovery Disputes.** Should counsel find they are unable to resolve a discovery dispute, the party seeking the relief shall contact chambers at (302) 573-6470 to schedule a telephone conference. Not less than forty-eight hours prior to the conference, by hand delivery or facsimile at (302) 573-6472, the party seeking relief shall file with the Court a letter agenda not to exceed two (2) pages outlining the issues in dispute. Should the Court find further

briefing necessary upon conclusion of the telephone conference, the Court shall order the party seeking relief to file with the Court a **TWO PAGE LETTER**, exclusive of exhibits, describing the issues in contention. The responding party shall file within five (5) days from the date of service of the opening letter an answering letter of no more than **TWO PAGES**. The party seeking relief may then file a reply letter of no more than **TWO PAGES** within three (3) days from the date of service of the answering letter.

6. **Confidential Information and Papers filed under Seal.** Should counsel find it will be necessary to apply to the Court for a protective order specifying terms and conditions for the disclosure of confidential information, they should confer and attempt to reach an agreement on a proposed form of order and submit it to the Court within 10 days from the date of this order. When filing papers under seal, counsel should deliver to the Clerk an original and two copies of the papers.

If after making a diligent effort the parties are unable to agree on the contents of the joint proposed protective order, then they shall follow the dispute resolution process outlined in paragraph 5(a).

7. **Settlement Conference.** Pursuant to 28 U. S.C. §636, this matter is referred to the United States Magistrate for the purpose of exploring the possibility of a settlement. If the parties agree that the possibility of settlement may be enhanced by such referral, the parties shall contact Magistrate Judge Thynge to schedule a settlement conference with counsel and clients.

8. **Summary Judgment Motions.** Prior to filing any summary judgment motion, the parties must submit letter briefs seeking permission to file the motion. The opening letter brief shall be no longer than five (5) pages and shall be filed with the Court no later than

February 12, 2004. Answering letter briefs shall be no longer than five (5) pages and filed with the Court no later than February 27, 2004. Reply letter briefs shall be no longer than three (3) pages and filed with the Court on or before March 8, 2004. The Court shall hold a status conference to hear argument and to determine whether the filing of any motion will be permitted on March 23, 2004 at 11:00 a.m. **Unless the Court directs otherwise, no letter requests to file a motion for summary judgment may be filed at a time before the dates set forth in paragraph 8.**

9. **Case Dispositive Motions.** Should the Court permit the filing of summary judgment motions an opening brief and affidavits, if any, in support of the motion shall be served and filed on or before April 2, 2004. Parties must submit an original and two (2) copies. Briefing will be presented pursuant to the Court's Local Rules, unless the parties agree to an alternative briefing schedule. Any such agreement shall be in writing and filed with the Court for approval.

10. **Applications by Motion.** Except as provided in this Order or for matters relating to scheduling, any application to the Court shall be by written -motion filed with the Clerk. Unless otherwise requested by the Court, counsel shall not deliver copies of papers or correspondence to Chambers. Any non-dispositive motion should contain the statement required by Local Rule 7.1.1.

11. **Oral Argument.** If the Court believes that oral argument is necessary, the Court will schedule a hearing Pursuant to Local Rule 7.1.4.

12. **Status/Daubert Conference.** On or before June 30, 2004, the parties shall meet and confer on any Daubert issues and motion in limine issues that any party wants to raise. On or before July 2, 2004, the parties shall submit a joint agenda identifying any Daubert issues that the

parties intend to raise. The Court will hold a telephone conference on July 7, 2004 at 11:00 a.m. to discuss Daubert issues identified in the joint agenda.

13. **Pretrial Conference.** On September 13, 2004, the Court will hold a Pretrial Conference in Chambers with counsel beginning at 9:30 a.m. Unless otherwise ordered by the Court, the parties should assume that filing the pretrial order satisfies the pretrial disclosure requirement in Federal Rule of Civil Procedure 26(a)(3). Thirty (30) days before the joint proposed pretrial order is due, plaintiff's counsel shall forward to defendants' counsel a draft of the pretrial order containing the information plaintiff proposes to include in the draft. Defendants' counsel shall, in turn, provide to plaintiff's counsel any comments on the plaintiff's draft as well as the information defendants propose to include in the proposed pretrial order. *Motions in limine*: No party shall file more than ten (10) motions in limine. Briefs (opening, answering and reply) on all motions *in limine* shall be filed by August 6, 2004. Opening and answering briefs shall not exceed five (5) pages and reply briefs shall not exceed three (3) pages. The parties shall file with the Court the joint proposed final pretrial order with the information required by the form of Final Pretrial Order which accompanies this Scheduling Order on or before August 16, 2004.

14. **Trial.** This matter is scheduled for a seven day jury trial beginning at 9:00 a.m. on October 12, 2004.

15. **Scheduling.** The parties shall direct any requests or questions regarding the scheduling and management of this matter to Chambers at (302) 573-6470.

UNITED STATES DISTRICT JUDGE

EXHIBIT 9

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

RICOH COMPANY, LTD. Plaintiff, v. AEROFLEX INCORPORATED, AMI SEMICONDUCTOR, INC., MATROX ELECTRONIC SYSTEMS LTD., MATROX GRAPHICS INC., MATROX INTERNATIONAL CORP., and MATROX TECH, INC., Defendants.	C.A. No. 03-103-GMS

DEFENDANTS' INITIAL DISCLOSURE STATEMENT

Pursuant to Federal Rule of Civil Procedure 26(a)(1), defendants Aeroflex Incorporated ("Aeroflex"), AMI Semiconductor, Inc. ("AMIS"), Matrox Electronic Systems Ltd. ("Matrox"), Matrox Graphics, Inc. ("Matrox Graphics"), Matrox International Corp. ("Matrox Int'l"), and Matrox Tech, Inc. ("Matrox Tech") (Matrox, Matrox Graphics, Matrox Int'l, and Matrox Tech are collectively referred to as "the Matrox entities") (Aeroflex, AMIS and the Matrox entities are collectively referred to as "Defendants"), hereby make the following Initial Disclosures. These disclosures are based on information reasonably available to Defendants at the present time. Defendants' investigation of the facts of this case is ongoing. Therefore, Defendants reserve the right to supplement these disclosures when and if additional information becomes available.

Defendants' disclosures are made without waiving, in any way: (1) the right to object on any basis permitted by law to the use of any such information, for any purpose,

in whole or in part, in any subsequent proceeding in this action or any other action; and (2) the right to object on any basis permitted by law to any other discovery request or proceeding involving or relating to the subject matter of these disclosures. All of the following disclosures are made subject to the above objections and qualifications.

A. Individuals with Discoverable Information

Pursuant to Fed. R. Civ. P.26(a)(1)(A), Defendants list the following individuals who are likely to have discoverable information relevant to the disputed facts in this action. In disclosing the individuals whom are employees, consultants or former employees of Defendants, Defendants do not authorize any effort by plaintiff Ricoh Company, Ltd., ("Ricoh") to contact individuals associated with any of the Defendants in connection with this lawsuit, except through appropriate counsel.

Name and Address	Subject Matter
Aeroflex	
Peter Milliken Director, Semi-Custom Products & Services Aeroflex UTMC Microelectronic Systems, Inc. 4350 Centennial Blvd. Colorado Springs, CO 80907	Design and development of Aeroflex' ASIC products
John Reinert Director, Program Management Aeroflex UTMC Microelectronic Systems, Inc. 4350 Centennial Blvd. Colorado Springs, CO 80907	Design and development of Aeroflex' ASIC products
Vern Schnathorst Design Manager, Standard Products Aeroflex UTMC Microelectronic Systems, Inc. 4350 Centennial Blvd. Colorado Springs, CO 80907	Design and development of Aeroflex' ASIC products

Brandon Coco Principal ASIC Engineer Aeroflex UTMC Microelectronic Systems, Inc. 4350 Centennial Blvd. Colorado Springs, CO 80907	Design and development of Aeroflex' ASIC products
James Webster Product Design Engineer Aeroflex UTMC Microelectronic Systems, Inc. 4350 Centennial Blvd. Colorado Springs, CO 80907	Design and development of Aeroflex' ASIC products
Anthony Jordan Director, Standard Products Aeroflex UTMC Microelectronic Systems, Inc. 4350 Centennial Blvd. Colorado Springs, CO 80907	Design and development of Aeroflex' ASIC products
David Kerwin Director, Mixed-Signal Products Aeroflex UTMC Microelectronic Systems, Inc. 4350 Centennial Blvd. Colorado Springs, CO 80907	Design and development of Aeroflex' ASIC products
Richard Bruder Chief Financial Officer Aeroflex UTMC Microelectronic Systems, Inc. 4350 Centennial Blvd. Colorado Springs, CO 80907	Financial

AMIS

Jon Stoner Chief Technology Officer AMI Semiconductor, Inc. 2300 Buckskin Road Pocatello, ID 83201	Design and development of AMIS' ASIC products
Bob Kirk Director, Applications Engineering-Digital ASICs AMI Semiconductor, Inc. P.O. Box 967 22960 Vantage Pointe Dr., Ste A Twain Harte, CA 95383	Design and development of AMIS' ASIC products

Matrox entities

Erik Boisvert Senior Engineer Matrox Electronic Systems Ltd. 1055, boul. St-Régis Dorval (Québec), Canada H9P 2T4	Design and development of the Matrox entities' ASIC products
David Chiappini ASIC Project Director Matrox Graphics Inc. 1055, boul. St-Régis Dorval (Québec), Canada H9P 2T4	Design and development of the Matrox entities' ASIC products
Ed Dwyer Executive Vice-President Matrox Graphics Inc. 1055, boul. St-Régis Dorval (Québec), Canada H9P 2T4	Design and development of the Matrox entities' ASIC products
Andres Desbiens Corporate Controller Matrox Electronic Systems Ltd. 1055, boul. St-Régis Dorval (Québec), Canada H9P 2T4	Financial

Other Individuals

To the extent Ricoh is advancing a claim construction that would read on the Defendants' logic design or logic synthesis practices, such a claim construction would be anticipated by a multitude of prior art logic synthesis systems and prior art logic design practices. Persons with knowledge of such prior art include Aart de Geus, CEO of Synopsys, Inc. ("Synopsys"), Mountain View and Sunnyvale, California, and David [illegible] Messers. de Geus, Gregory, and Cohen, and Ms. Bartlett all have knowledge of the prior "Socrates" logic synthesis system; Paul Drongowski of Compaq Corporation, address

unknown, who has knowledge of the prior art "Gdl" synthesis system; John Darringer, address unknown, who has knowledge of the prior art "LSS" logic synthesis system; and Kurt Keutzer, Department of Electrical Engineering and Computer Sciences, University of California at Berkeley, who has knowledge about the prior art "Dagon" synthesis system. Other prior art logic synthesis systems are believed to be relevant and will be identified as defendants obtain more information about these systems.

In addition, Defendants believe that a number of additional individuals are likely to have personal knowledge about prior art relating to logic synthesis systems and logic design practices, including individuals at Cadence Design Systems, Inc., San Jose, California, Monterey Design Systems, Sunnyvale, California, Magma Design Automation, Cupertino, California, Get2Chip, Inc., San Jose, California, Incentia Design Systems, Inc., Santa Clara, California, Stanford University, Stanford California, University of California at Berkeley, Berkeley, California, University of Southern California, Los Angeles, California, and Carnegie-Mellon University, Pittsburgh, Pennsylvania.

Defendants additionally believe that a number of present or former employees of Ricoh, International Chip Corporation and Knowledge Based Silicon are likely to have information about the scope of the subject matter of the claims of U.S. patent number 4,922,432 (the "'432 patent") and about Defendant's laches and equitable estoppel defenses, including at least Hideaki Kobayashi, address unknown, Masahiro Shindo, address unknown, and James P. Davis, Department of Computer Science and Engineering, University of South Carolina, Columbia, South Carolina.

B. Documents

Defendants identify the following categories of documents and tangible things in the possession, custody or control of Defendants located at, among other places, their principal places of business that are relevant to the disputed facts in this action.

1. Product design and development materials
2. Marketing and promotional materials
3. Sales and accounting statements
4. Correspondence
5. Reports
6. Presentations
7. Publications
8. Electronic files

Defendants are in the process of providing the documents described in Items 1 through 8 above to their counsel.

Defendants reserve the right to supplement these disclosures should new information become available.

C. Computation of Damages

Defendants seek attorneys' fees and costs. Although the total amount of Defendants' fees and costs are unknown at this time, Defendants reserve the right to supplement this Disclosure as discovery proceeds and additional information becomes available.

D. Insurance Policies

There are no insurance policies referred to in Fed. R. Civ. P. 26(a)(1)(D) that Defendants are aware of at this time.

Dated: May 30, 2003

By: _____

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Christopher L. Kelley
Erik K. Moller
HOWREY SIMON ARNOLD &
WHITE, LLP
301 Ravenswwod Ave.
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Attorneys for Defendants/
Counterclaimants AEROFLEX
INCORPORATED, AMI
SEMICONDUCTOR, INC., MATROX
ELECTRONIC SYSTEMS, LTD.,
MATROX GRAPHICS INC.,
MATROX INTERNATIONAL CORP.
and MATROX TECH, INC.

CERTIFICATE OF SERVICE

I hereby certify that a true and correct copy of the foregoing Initial Disclosure Statement of Intervenor Synopsys, Inc. was served this 20th day of May, 2003 on the following First Class U.S. Mail:

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Gayle L. Jacob